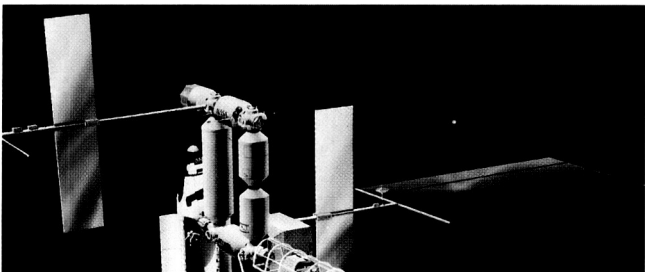
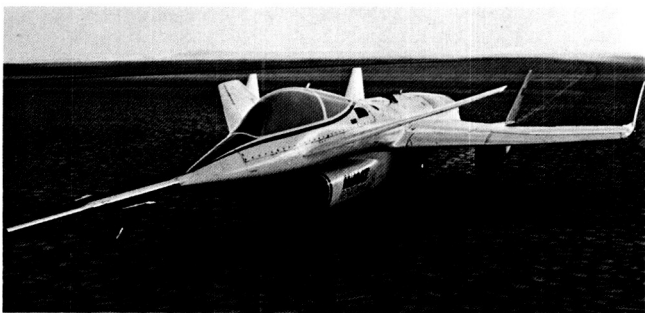
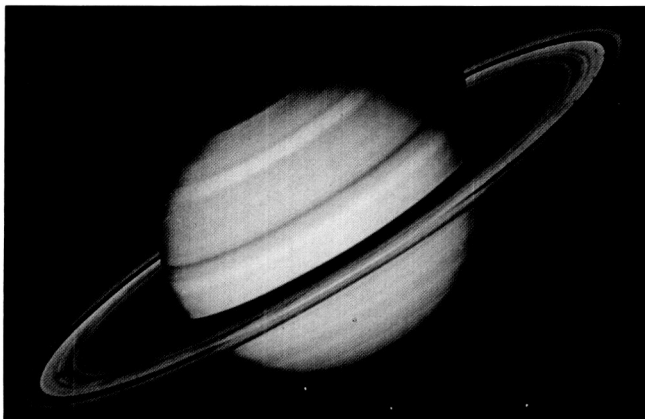


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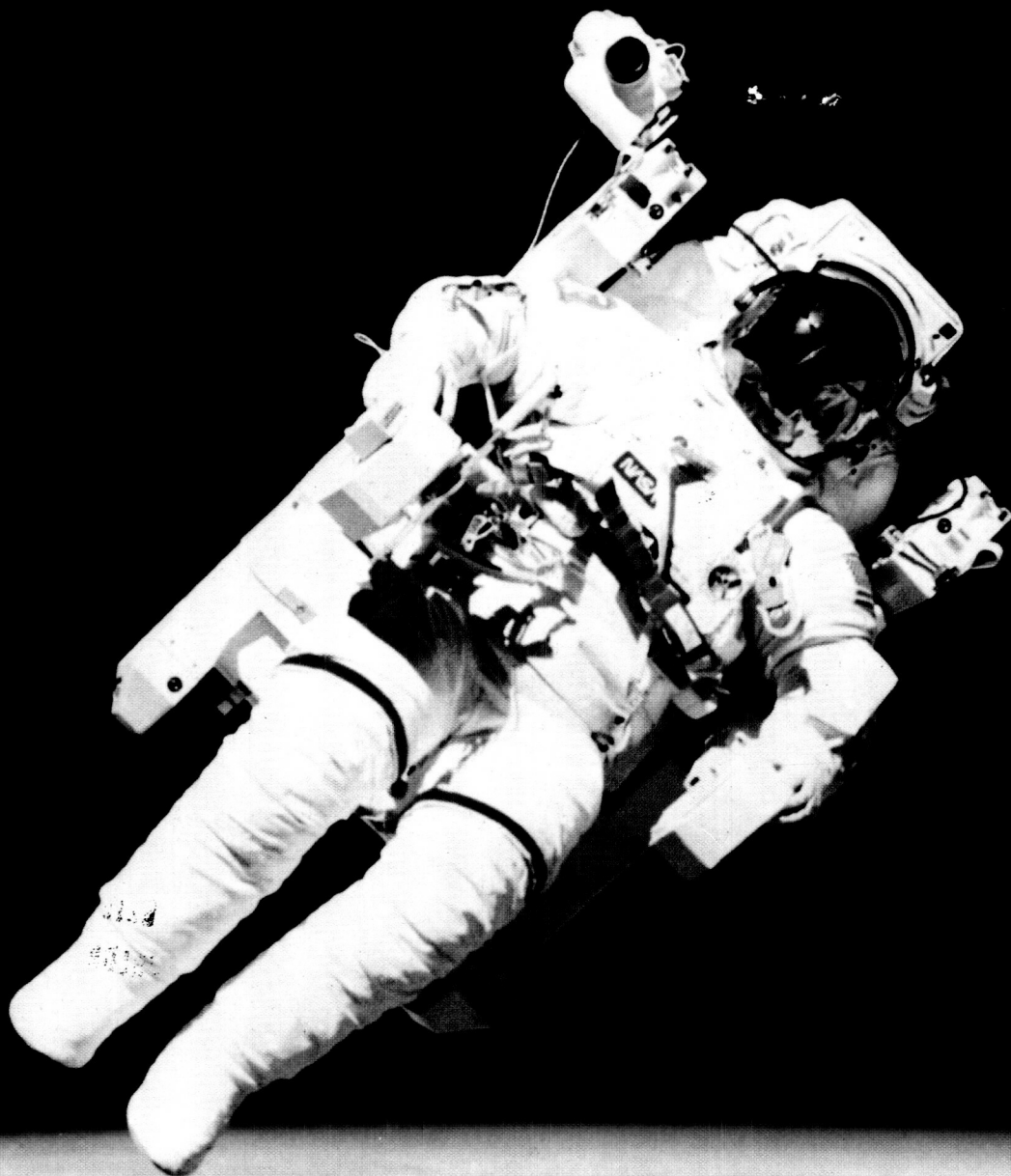
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Published by:

NASA

Office of Small and Disadvantaged
Business Utilization
Washington, DC 20546

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November 1986 ✓

For Sale by the Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

Cover:

Top, The planet Saturn as seen by Voyager 2 from a distance of 21 million kilometers (three of Saturn's moons are seen as white dots along the bottom of the picture).

Center, The Highly Maneuverable Aircraft Technology (HiMAT) vehicle, a remotely-piloted research plane, is representative of NASA's advanced aeronautics programs.

Bottom, Artist's concept of a Space Station, depicting a base structure consisting of a number of clustered modules with solar panels extending outward.

Astronaut Bruce McCandless II performs an historic extravehicular activity in the first use of the manned maneuvering unit.

Right, After a flawless countdown, Challenger lifts off to begin the tenth Space Shuttle mission.

Foreword

**NASA Headquarters
Washington D.C. 20546**

This handbook has been prepared with but a single purpose in mind—to assist you, the prospective contractor, in the process of doing business with NASA. We intend that it tell you in a straightforward way who we are, where we are and what we buy. And perhaps most importantly, we wish to assist you in marketing your product with NASA, whether it be an abstract idea, a manufacturing capability, a fabricated component, construction, basic materials or a specialized service. NASA buys all of these, and more.

Your capability, your potential and your willingness to participate is essential to the accomplishment of NASA's mission. We wish to know who you are, and to learn what you can do. We sincerely hope that you will take the time to read this brochure and understand our basic theme of providing an opportunity for all to participate equitably in the nation's aeronautics and space programs.

We urge that you pursue this brief introduction. We would sincerely welcome your personal or written inquiry and trust that your marketing endeavors with NASA will be a mutually profitable and fruitful experience.

A handwritten signature in black ink, appearing to read 'Stuart J. Evans', with a stylized, sweeping flourish at the end.

Stuart J. Evans

**Assistant Administrator
for Procurement**

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*NASA Headquarters Offices are located
near the U.S. Capitol in Washington, D.C.*



The National Aeronautics and Space Administration (NASA) was established by the National Aeronautics and Space Act of 1958 to plan, direct, and conduct aeronautical and space activities for peaceful purposes for the benefit of all mankind. NASA's goals in space are to develop technology to make operations more effective, to enlarge the range of practical applications of space technology and data, and to investigate the Earth and its immediate surroundings, the natural bodies in our solar system, and the ori-

gins and physical processes of the universe. In aeronautics, NASA seeks to improve aerodynamics, structures, engines, and overall performance of aircraft, to make them more efficient, more compatible with the environment, and safer. This chapter is intended to acquaint prospective contractors with the organizational structure of NASA, and to briefly describe the major technical program offices and selected staff offices at the Headquarters level.

This Is NASA

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NASA's mission is planned, directed, and coordinated from its Headquarters in Washington, D.C., the focal point for policy and program formulation. The operational aspects of NASA's work in aeronautics and space are performed through its spaceflight centers, research centers and other installations at various locations throughout the country. Each installation has a specifically prescribed mission, with related tasks, and is allocated the resources necessary for their accomplishment. Though these NASA installations have unique "in-house" capabilities, their research and operations are pursued mainly through private industry, with the additional support of universities and other nonprofit research organizations. The installations and their major technical programs are described in Chapter 5.

The overall management and allocation of resources for NASA technical programs is accomplished through four Headquarters program offices. The primary research and development activities of these offices, which assign mission responsibilities to NASA field installations as appropriate, are as follows.

Program Offices

Research and Development Activities

The Office of Aeronautics and Space Technology (OAST) is responsible for the conduct of advanced research and technology programs which enable and enhance our national objectives of continued preeminence in civil and military aerospace; investigation of the feasibility of selected advanced technology at the component or system level, to establish the benefits and practical utility of the advances; support of the military in development and demonstration of superior military



*View of one of three Nasa Headquarters
Offices.*

systems; conduct of complementary research related to aircraft safety in support of the Federal Aviation Administration; and coordination of the application of NASA capabilities and facilities with programs of other agencies to accomplish energy-related research and development, on a reimbursable basis.

OAST research and development in the field of aeronautics provides the advanced technology which will enable future air transportation systems to offer superior performance in terms of speed, range, comfort and safety, and at reduced direct operating costs. Major thrusts include:

—Development of new computational capabilities to improve the understanding of complex aerodynamic flows and other complex problems related to integrated vehicle design. Development of new aerodynamic test facilities and measurement techniques to more accurately predict vehicle performance.

—Propulsion research in the areas of computational methods, turbomachinery, combustion and fuels, engine control systems, advanced materials and design methodology, noise and instrumentation that will

lead to propulsion system improvements for a broad range of vehicle applications, ranging from small, general aviation aircraft to commercial transports, helicopters, and military aircraft.

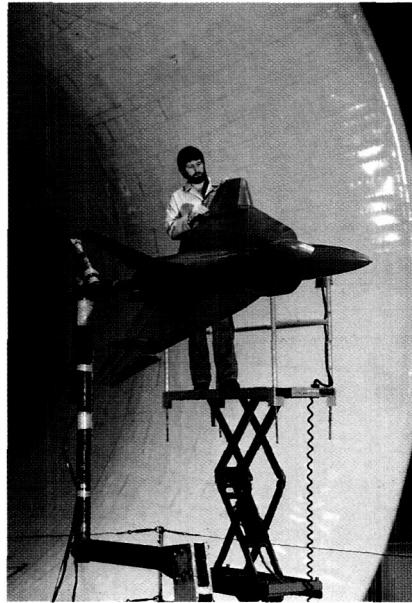
- Technology to improve the efficiency and safety of flight systems, including improved design analysis and optimization theory, advanced composite materials, crash dynamics, advanced control theory, flight path management, meteorological effects, and human factors effects of increased automation.

- Advancing the critical technologies needed to improve rotorcraft performance and operational capability, increase jet transport efficiency through increased use of advances such as composite structures and drag reduction techniques, and to extend the benefits of propeller fuel economy to new generations of high-speed turboprop aircraft.

OAST space research and technology programs provide the advanced technology base upon which NASA, commercial, and military space activities depend for improving existing and planned systems operational capability, reliability, and affordability, and to enable future missions. Technology research is conducted both in ground-based laboratories and in space facilities such as the Shuttle Orbiter, Spacelab, and free-flying platforms. Major thrusts include:

- Expanding the basic understanding of the aerothermodynamics, gas dynamics, material behavior in space environment, and flight mechanics associated with atmospheric entry, Earth orbital, and planetary missions.

- Chemical propulsion research to



NASA engineer inspects a scale model of the F-16 XL aircraft before testing in a wind tunnel at Langley Research Center.

improve life, performance, versatility, and reliability of chemical propulsion systems for Earth-to-orbit main engines, orbital transfer vehicles, and long-life, low-thrust auxiliary propulsion.

- Development of technology for high-capacity space power systems, high-temperature thermal-to-electric conversion, ion propulsion, and nuclear reactor conversion technology for long duration missions.

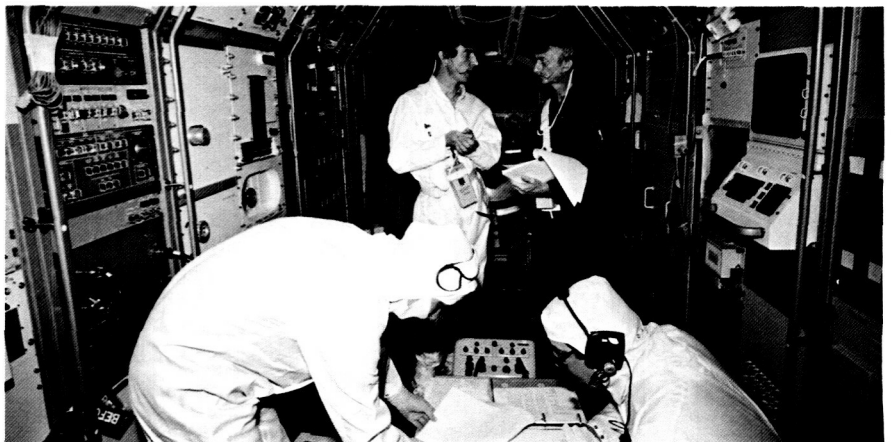
- Development of advanced materials and structures for more durable thermal protection systems and large, deployable space structures.

- Research in electronics, computer science, and robotics to develop advanced technology for increased use of automation, improved information processing, and advanced communications systems.

OAST energy research and technology programs are concerned with developing the technology for economical and reliable utilization of solar energy, such as wind energy, solar thermal, and solar cell systems; fuel flexible end-use conversion systems, such as fuel cells; and fuel flexible gas turbine and Stirling automotive engines and electric vehicles.

The Office of Aeronautics and Space Technology has institutional management responsibility for Ames Research Center, Langley Research Center and Lewis Research Center.

The Office of Space Flight (OSF) is responsible for the management, direction and coordination of all U.S. civil launch programs, and for U.S. responsibilities for Spacelab development, procurement and operations. The OSF principal mission is to develop a national Space Transportation System (STS) to significantly improve the access of man and instruments to space—enhancing the flexibility and productivity of space missions. While the STS is based on the Space Shuttle and a



Technicians working inside the Spacelab I Flight Module in the Kennedy Space Center Operations and Checkout Building.

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family of expendable launch vehicles, the Shuttle is the key element in providing multi-purpose, economical space operations for Earth applications, scientific, technological and national security payloads.

Office of Space Flight programs are broadly divided into three major areas:

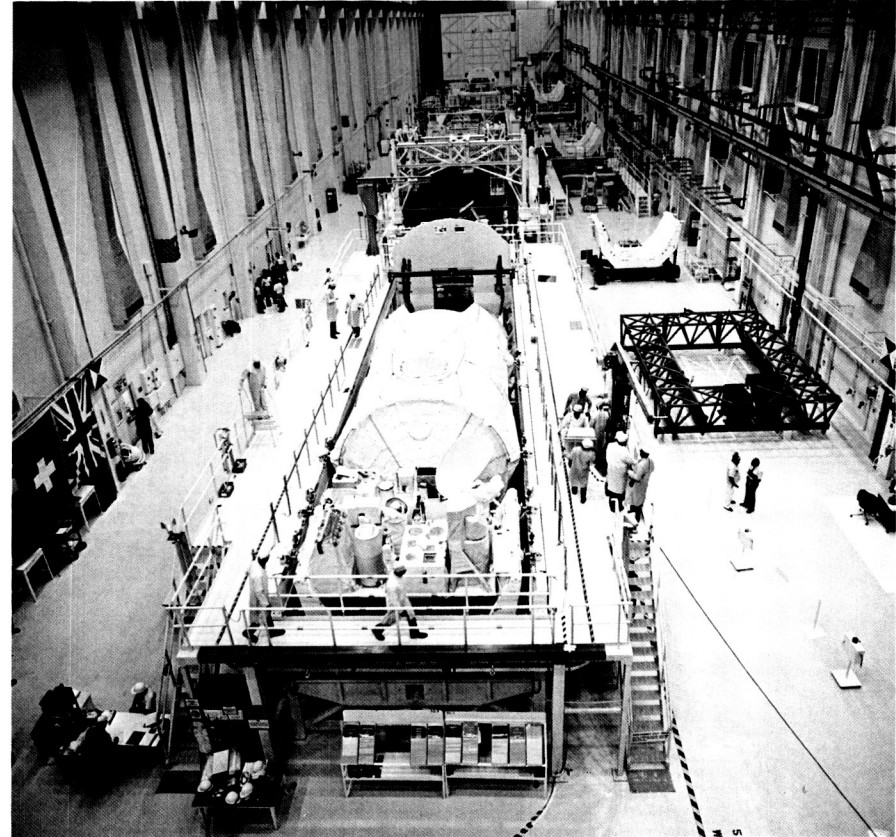
- Development of space transportation capabilities—the acquisition, testing, production, and continuing improvement of the STS, comprised of the national fleet of Space Shuttle orbiters, external tanks, solid rocket boosters, Spacelab, upper stages, and ground systems.

- Space flight operations—pre-launch, launch, flight, landing, and post-landing activities, including those with expendable launch vehicles.

- Advanced programs—the planning and evolutionary development of follow-on programs for space transportation and other large space systems (particularly of permanent orbital platforms and facilities) and the advanced orbital test and transportation systems required to support them.

The Office of Space Flight has institutional management responsibility for Johnson Space Center, Kennedy Space Center, Marshall Space Flight Center and the National Space Technology Laboratories.

The Office of Space Science and Applications (OSSA) is responsible for all research and development activities which utilize space systems, supported by airborne and ground-based observations, to conduct scientific investigations of the earth and its space environment, and for the identification, development and demonstration of space-related sys-



tems technology and other capabilities which can be used for practical benefits to mankind. The elements of OSSA programs can be divided into two groups—those whose goal is primarily scientific understanding and those whose goal is primarily to improve the usefulness of space for nearer-term purposes. The first group includes efforts to observe the distant universe, explore the near universe, understand Earth's space environment, and characterize Earth as a planet. The second group consists of programs in life sciences, satellite communications and studies of materials under microgravity conditions.

Observation of the distant universe involves measurements of all forms of radiation and particles reaching Earth from beyond the solar system, and includes study of the sun. The subjects under study deal with the origin, evolution, and structure of the universe, and with the fundamental laws of physics that govern the behavior of matter in the large scale.

Spacelab I, built by the European Space Agency, is being prepared for hoisting out of its test stand and into the payload transport canister.

As this document was being published, two additional Program Offices were established at NASA Headquarters.

The Office of Space Station is responsible for directing NASA's efforts to develop a permanently manned space station within a decade. The office will provide overall policy and program direction for the Space Station program.

The Office of Commercial Programs is responsible for a program to facilitate and expand opportunities for U.S. private sector investment and involvement in civil space and space-related activities.



This false color scene of the Chesapeake Bay, national capital region was taken by the Thematic Mapper aboard the Landsat 4 spacecraft.

Exploration of the near universe involves visits to and studies of the full range of objects and environments space flight has made directly accessible. The questions investigated deal with the origin and evolution of the solar system, and the comparison of Earth with other planets. Measurements have focused on the internal structure, surface features, atmospheres, and plasma environments of the planets and satellites.

Characterizing Earth and its environment has involved measurements of neutral and ionized particles and the electric and magnetic fields of Earth and its surroundings. The questions addressed focus on how the solid planet, land surfaces, oceans, atmosphere, and plasmasphere function and interact. The origin of life on Earth and how it has evolved and is maintained also are studied.

The Life Sciences program seeks to ensure the health, safety, well-being, and effective performance of humans in space, and to prepare the way for humankind to take a place in the larger environment of the solar system. It uses the space environment to advance knowledge in medicine and biology by conducting experiments on living organisms in space.

The Communications program seeks to develop high-risk, advanced multiple-frequency-band technology for space communications to support a wide range of future communications systems required by NASA, other government agencies, and U.S. industry.

The Materials Processing program consists of ground-based and

space-based research to improve basic understanding of materials and materials processes, and to explore processing that can be carried out to advantage in space. The knowledge it provides could lead some day to development of a new industry in space.

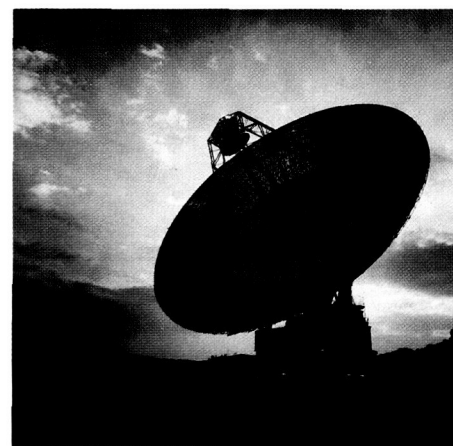
The Office of Space Science and Applications has institutional management responsibility for Goddard Space Flight Center and the Jet Propulsion Laboratory.

The Office of Space Tracking and Data Systems (OSTDS) is responsible for providing vital tracking, command, telemetry, and data acquisition support to meet the requirements for Space Shuttle, Earth-orbital satellites, planetary spacecraft, sounding rockets, and research aircraft. Two worldwide tracking networks, one for deep space missions and one for Earth-orbital missions, provide this support. When the Tracking and Data Relay Satellite System (TDRSS) becomes operational in 1984, it will take over tracking and data acquisition for low Earth-orbiting spacecraft. This will permit closure of most of the existing ground tracking stations, and those remaining ground stations will be consolidated with the Deep Space Network (DSN). This combined network will support deep space missions, as well as highly elliptical, synchronous, and other Earth-orbital missions not supported by TDRSS.

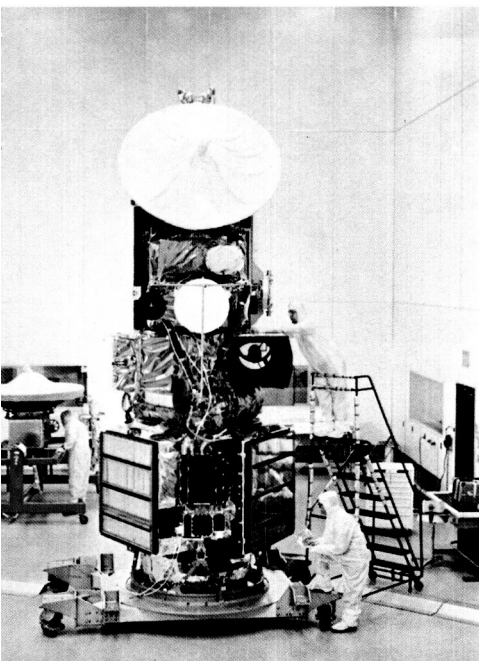
Control centers and data processing facilities provide real time data processing for mission control, orbit and attitude determination, as well as routine processing of telemetry data for applications and scientific missions. OSTDS provides a global communications system linking the tracking sites with all of the above facilities, utilizing leased terrestrial and satellite services offered by private industry.

Specific goals and objectives of the Office of Space Tracking and Data Systems include:

- Improve the efficiency of handling and processing large volumes of data.
- Upgrade the communications support provided by NASCOM (the NASA network of leased communications services for operational data flow among stations, central facilities, and users) to meet the demands of NASA missions with higher data rates.
- Provide technology development to facilitate use of the TDRSS space network.
- Increase telemetry reception capabilities for Voyager's encounters with Uranus and Neptune.
- Continue support to the aeronautics, sounding rocket, balloon, and geodynamics programs.
- Modernize mission-support computing.



Deep Space Network tracking station (65 meters in diameter) located near Madrid, Spain.



Landsat-4 Satellite undergoes preparation for launch.

- Provide a single, efficient network for program-support communications.

- Begin definition of a TDRSS follow-on system.

Staff Offices

In addition to the program offices described above, there are several key staff offices at the Headquarters level which have significant responsibilities relative to NASA procurement, or otherwise frequently interact with NASA contractors.

Office of Procurement

The NASA Headquarters Office of Procurement has functional management responsibility for NASA's procurement programs. It develops and promulgates policies and procedures governing the operations of procurement activities for the entire agency. It is responsible for the direction, coordination and review of all procurement functions, including planning, solicitation, evaluation, contracting, and administration. It is responsible for the implementation of the Federal Acquisition Regulation and for the development of additional procurement regulations required for the accomplishment of NASA's mission. Other responsibilities include compilation and analysis of procurement information and the preparation of periodic and special reports on NASA procurement activities.

The Headquarters **Contracts and Grants Division** is the procuring or-

ganization for Headquarters program and staff offices. As a result of the diverse nature of Headquarters programs, this division handles a wide variety of research, study and support contracts. Like all NASA installations, it negotiates and awards grants and cooperative agreements for basic scientific research to qualified institutions. The division also has agency-wide responsibility for foreign procurements.

The following are typical Headquarters procurement requirements: management analysis studies in support of program and staff offices; system engineering services; reliability studies; services relating to radio, T.V., motion pictures, exhibits, graphics and publications; automatic data processing hardware, software and related services; patent services; economic studies; and technical information services, including technical writing and foreign language translations.

NASA Small Business Offices offer individual counseling sessions to businesses interested in marketing opportunities.

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Office of Small and Disadvantaged Business Utilization

The Headquarters **Office of Small and Disadvantaged Business Utilization** is responsible for the development and management of NASA programs to assist small businesses, as well as firms which are owned and controlled by socially and economically disadvantaged individuals. The office functionally oversees and directs the activities of corresponding offices at each NASA installation. The primary objective of the small business program is to increase the participation of small and disadvantaged businesses in NASA procurement. In support of this objective, the office offers individual counseling sessions to business people seeking advice on how to best pursue contracting opportunities with NASA (see Chapter 3). Specific guidance is provided regarding procedures for getting on bidder's mailing lists, current and planned procurement opportunities, arrangements for meetings with technical requirements personnel and various assistance or preference programs which might be available (see Chapter 4).



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NASA contracting officers refer to the Federal Acquisition Regulation as the governing authority for all procurements.

The policies and procedures for conducting NASA procurements subsequent to April 1, 1984, are contained in the Federal Acquisition Regulation (FAR). The FAR, together with the NASA FAR Supplement which contains regulations uniquely applicable to NASA, is the governing authority for NASA procurements. These documents are available from the Superintendent of Documents, Government Printing Office, Washington, DC 20402. The information presented in this chapter is intended to briefly acquaint individuals who are new to federal procurement with the basic process, but it should be understood that the actual rules and procedures are substantially more complex. The FAR, or other competent authority, should be consulted for a more thorough review of the procurement process.

The Procurement Process

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Identification of the Requirement

The procurement process typically is initiated when a particular program or project office identifies a requirement and submits a procurement request to the procurement office. The assigned contracting officer, in consultation with the small business representative and the technical officer, will then make several key decisions. One of these is whether the required supplies or services are available from other government sources, such as stock items at a General Services Administration (GSA) supply depot, or if they may be purchased from authorized suppliers listed on a GSA Federal Supply Schedule. If so, the contracting officer must acquire the items from the depot directly or from suppliers on the schedule. Thousands of common articles (office equipment and supplies, for example) are included on the Federal Supply Schedule, and firms interested in getting their products listed should contact a Business Service Center of the GSA for additional information:

Another important decision is whether the procurement should proceed under one of the preference programs described in Chapter 4 (such as setting the procurement aside for the exclusive participation of small business). The appropriate method of conducting the procurement is also decided—whether it should be by sealed bids, competitive proposals or other competitive procedures. In rare cases, a noncompetitive procurement technique may be necessary (such as when there is only one responsible source). Once these decisions have been made, the contracting officer begins the preparation of the solicitation package and arranges for the announcement of the solicitation through various channels.

Announcement of the Solicitation

Several techniques are used to inform prospective bidders of contracting opportunities. Each NASA installation maintains its own source file of information regarding the capabilities and products or services of companies expressing an interest in doing business with that installation. When a procurement need arises, a bidders list is prepared based on information in the files and other available information, and a copy of the solicitation is sent to enough companies on the list to be reasonably sure of adequate com-

ness Development Agency's PRO-FILE System. Instructions regarding procedures for submitting information to these agencies as well as to each NASA installation are contained in Chapter 3.

The *Commerce Business Daily* (CBD) is the official announcement medium for federal procurements. When the anticipated value of the contract exceeds \$10,000, a notice of the pending procurement is normally placed in the CBD at least fifteen days prior to issuance of the solicitation. A copy of the solicitation is sent to companies requesting it on a first-come, first-served basis, until the supply is exhausted. Infor-



petition, appropriate to the size and nature of the procurement. (It is important to note, however, that all companies on the list are not necessarily notified of the procurement). Installations may also use other source files as necessary, such as the Small Business Administration's Procurement Automated Source System (PASS), or the Minority Busi-

The Commerce Business Daily and Bid Rooms at each Installation are important sources of information on NASA procurements.

Procurement Method		
Sealed Bids	= IFB =	Primarily selected on price
Competitive Proposals	= RFP =	Selected on price, technical capabilities and other factors

mation on contract awards and other significant government business announcements are also included in the CBD. A subscription to this publication may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

Another source of information on NASA procurements is the bid room. Each NASA installation maintains a bid room in which all of its current solicitations are available for inspection by prospective contractors. A central bid room with information on all open NASA solicitations is maintained by the Headquarters Small Business Office in Washington, D.C.

der this procurement method is called an *Invitation for Bids* (IFB), and the response is a *bid*. The rules and procedures for submitting and evaluating bids in response to an IFB are very rigid. Likewise, the performance of the contract by the successful bidder must strictly adhere to the stated specifications and the agreed upon price. (For example, an increase in materials or production costs could not be passed along to the Government).

Although sealed bidding is the preferred method of awarding contracts, NASA's heavy emphasis on research and development normally requires a more flexible contracting approach. Consequently, most NASA procurement dollars are spent utilizing competitive proposals.

Procurement Method

One of the first decisions made by the contracting officer is whether the procurement will be conducted using sealed bids or competitive proposals. The distinction between these two methods does not relate to the manner in which they are publicly announced, nor to the extent of competition for contract awards. The primary difference between sealed bidding and competitive proposals is the way the responses to the solicitation from prospective contractors are evaluated.

Sealed Bidding

The main criterion for evaluating a response to a procurement utilizing sealed bids is *price*. In such procurements, the specifications or exact performance requirements can usually be clearly stated, required delivery dates are known, and the contract is simply awarded to the lowest qualified bidder.

Sealed bid procurements are particularly appropriate in supply-type contracts for the purchase of standard commercial items. A solicitation un-

Competitive Proposals

It is important to understand that solicitations using competitive proposals are normally just as widely announced and maximum competition is sought just as it is in sealed bidding. The key difference between the two methods is that competitive proposals allow for consideration of factors other than price, such as the technical capabilities of the prospective contractor and the anticipated effectiveness of the proposed approach to performance. A solicitation for competitive proposals is called a *Request for Proposals* (RFP), and the response is a *proposal*. This method is very useful for awarding research and development contracts, which comprise the bulk of NASA procurement, because exact requirements and associated costs cannot normally be specified in advance.

The selection process when competitive proposals are requested generally involves evaluation of proposals to determine which offerors are in the competitive range (i.e., have a reasonable chance of being selected), negotiations or discussions with firms

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Construction contracts contain unique requirements of which prospective contractors should be aware. Pictured at left are groundbreaking ceremonies for the Landsat Facility at GSFC, built by a small, minority-owned company.

in the competitive range, tentative selection of the apparently successful offeror, and final negotiation with that company prior to award of the contract. The evaluation of proposals is often performed by a Source Evaluation Board, consisting of a group of NASA officials familiar with both procurement procedures and the technical requirements of the RFP. A detailed description of this evaluation-selection process is contained in the *NASA Source Evaluation Board Manual* (NHB 5103.6A), which is available from the Superintendent of Documents, Government Printing Office, Washington, DC 20402.

Construction Contracting

Although *contracting for construction* is in many ways similar to other procurement utilizing sealed bids, there are some unique aspects of which prospective contractors in this field should be aware. One of the most important of these is the requirement for bonding. Under the provisions of the Miller Act, NASA construction contractors are required to post performance and payment bonds, on contracts in excess of \$25,000, to protect the Government's interest in the proper and timely completion of the work, and to secure payment for labor and material furnished under the contract. Small

construction firms which may experience difficulty in obtaining a bond should inquire into the surety bond program administered by the Small Business Administration.

Special bid forms (and in some cases bid guarantees) and site inspections are additional unique aspects of construction contracting. Firms which are unfamiliar with bidding on Government construction jobs are encouraged to meet with appropriate personnel at the nearest NASA installation for a more detailed explanation of the requirements. The installation Small Business Office will assist in arranging such appointments if requested.

Architect-Engineer Contracting

Selection of *Architects and Engineers* (A&E) is accomplished through an Architect-Engineer Selection Board at each NASA field installation, in support of a full range of facilities and construction management activities. The Board reviews the qualifications of firms interested in performing A&E work in connection with NASA construction projects, and in the case of procurements estimated to cost more than \$10,000, the Board conducts oral or written discussions with a minimum

of three firms. The Board submits a report to the installation Director recommending, in order of preference, those firms considered best qualified to perform the services required. Upon approval by the installation Director of the list of qualified A&E firms, contract negotiations are conducted with the firm given first preference. If a mutually satisfactory contract cannot be agreed to, negotiations are then initiated with the firm given second preference on the list. Generally, this procedure continues until a contract has been negotiated.

Pursuant to 10 U.S.C. 2306(d), the amount of the fee that may be paid to an architect-engineer under a cost-plus-fixed-fee contract for the production and delivery of the design, plans, drawings, and specifications may not exceed six per cent of the estimated cost of the related construction project, exclusive of the amount of such fee. In addition, it is NASA's policy to apply this statutory limitation to the fee paid to an architect-engineer for the performance of such services under a fixed-price contract.

Since each Architect-Engineer Selection Board maintains a list of qualified firms for various types of projects, A&E firms should file Standard Form 254 (Architect-Engineer and Related Services Questionnaire)



Equal Opportunity Officers are available at each NASA Installation to help contractors understand and meet equal opportunity requirements.

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with the various NASA field installations and with NASA Headquarters, Office of Facilities. Firms are encouraged to keep their A&E qualification information current, preferably on an annual basis. Firms may also be required to file Standard Form 255 (Architect-Engineer and Related Services Questionnaire for Specific Project), when additional information is needed on a particular project.

Additional Contracting Considerations

There are many requirements which prospective contractors must meet or agree to prior to being awarded a NASA contract. Some of the more important of these are in the areas of equal opportunity, reliability and quality assurance, safety and health, industrial relations and security. Other representations and certifications may also be required. Questions in this area should be addressed to the contracting officer identified in the solicitation package.

Equal Opportunity

Pursuant to Executive Order 11246 as amended, and the rules and regulations of the Department of Labor, a standard "Equal Opportunity" clause is prescribed for use in all non-exempt contracts in excess of \$10,000. Under this clause, the contractor or subcontractor is obligated

not to discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin, and is required to take affirmative action to ensure equal employment opportunity. A bidder or offeror may be required to include a representation concerning the filing of compliance reports in accordance with the Equal Opportunity clause in his/her bid or proposal.

Additionally, Executive Order 11141 and the Age Discrimination in Employment Act of 1967, prohibit discrimination on the basis of age. Further, the Rehabilitation Act of 1973, as amended, and Executive Order 11758 cover non-discrimination standards with respect to the Handicapped. The Vietnam-era Veterans Readjustment Act of 1974, as amended, prescribes affirmative action requirements in the employment and advancement of qualified disabled veterans and veterans of the Vietnam era.

An Equal Opportunity Officer is available at each NASA installation to assist prospective contractors in understanding and meeting the equal opportunity requirements.

Reliability and Quality Assurance

NASA tailors reliability and quality assurance requirements for each contract in order to effectively achieve reliability and quality commensurate with mission objectives.

For space systems and their major elements, contractors are required to operate reliability and quality programs in accordance with NASA publications NHB 5300.4(1A) "Reliability Program Provisions for Aeronautical and Space System Contractors" and NHB 5300.4(1B) "Quality Program Provisions for Aeronautical and Space System Contractors," or selected provisions of these publications. Major subcontracts will invoke the same requirements. Direct NASA contracts and lesser subcontracts will invoke selected provisions of NHB 5300.4(1C) "Inspection System Provisions for Suppliers of Space Materials, Parts, Components and Services." For the Space Transportation System/Space Shuttle Program, contractor programs may have to meet the requirements of NHB 5300.4 (1D-2), "Safety, Reliability, Maintainability and Quality Provisions for the Space Shuttle Program," and NHB 1700.7A, "Safety Policy and Requirements for Payloads Using the Space Transportation System." Other NASA, military or Federal specifications will be invoked as appropriate to the hardware involved. Copies of these publications may be obtained from the NASA installation inviting bids/proposals or purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Safety and Health Program

NASA's policy is to take all practical steps to avoid loss of life, personnel injury or illness and loss of property. Specific requirements to implement this policy are found in each contract and are intended to preclude loss. In all contracts the applicable Occupational Safety and Health Act Standards are invoked. Other Federal as well as industry standards may also be included for specific areas of concern. Given the critical nature

and high value of NASA operations, strict adherence to contract safety and health provisions is mandatory and will be subject to thorough evaluation during the life of the contract.

Industrial Relations

Labor relations is one of the important factors involved in contract performance. NASA has a labor policy of neutrality and the union or non-union status of a bidder is not a factor in the award of contracts. The bidder's assessment of labor costs may be affected by the local labor relations environment and applicable labor agreements; therefore, bidders should be particularly aware of potential obligations resulting from legal precedents applicable to successor contracts.



Prospective contractors should be sure all contract requirements are understood, and may wish to consult with contracting officers to resolve questions.

Security Clearance

Should a NASA contract or solicitation require access to classified information, an industrial security clearance will be required. The procurement solicitation will cite this requirement when necessary. As a participant in the Department of Defense (DoD) Industrial Security Program, NASA, when the security requirement exists, will request the DoD to process the company's application. Specific inquiries may be addressed to the procuring NASA activity. Further procedures and requirements are set forth in the "Industrial Security Manual for Safeguarding Classified Information" (DoD 5220.22-M). This document may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Contract Administration

Once a contract award has been made and performance has started, the Government begins the process of contract administration. Contract administration is the responsibility of the contracting officer, but certain functions may be delegated by inter-agency agreement to cognizant agencies of the Department of Defense (such as the Defense Contract Administration Service and the Defense Contract Audit Agency). There are many accounting, reporting and other contractual requirements associated with performing on Government contracts, the delineation of which would be outside the scope of this publication. However, prospective contractors should be absolutely sure that all of these requirements are well understood prior to acceptance of a Government contract. NASA field installation Small Business Offices will assist companies seeking advice in this regard upon request.

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Effective marketing of a firm's capabilities is essential in the Government market, just as it is in the private sector.

The Federal Government is the largest purchaser of goods and services in the world. Collectively, Government agencies spend approximately \$160 billion annually. Despite this enormous expenditure, however, Government contracts are not easily obtained—competition is fierce. All firms, and particularly small companies, are finding it increasingly necessary to aggressively seek out contracting opportunities. This process requires perseverance, patience, and good business skills and judgment. The most successful companies are generally the ones which have mastered effective marketing techniques for winning contracts, and subsequently follow-through with competent contract performance. This chapter is designed to be a primer on how to market to NASA. While the information presented is specific to NASA, many of the principles are applicable to other agencies as well. It is hoped that the following information will provide useful guidance in the development of a productive marketing program.

Marketing Your Capabilities

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Nature of the Market

Total NASA procurements with business firms totalled \$5.6 billion in FY 1983, with thousands of companies participating in the process. As a first step in selling to NASA, prospective contractors should become familiar with the predominant types of goods and services NASA buys, the locations at which they are bought, and the aggregate dollar volume of purchases in a given area. Careful consideration needs to be given to what extent NASA represents a viable market for any particular firm; i.e., how close is the match between a firm's capabilities and NASA's needs. It is important not to expend too much marketing effort in instances in which the prospect of a contract does not appear likely. This is particularly true for small companies, which normally have very limited resources for marketing. The general technical program descriptions presented in Chapter 5 may be useful in gaining a better understanding of NASA's procurement activities on a broad scale. Additionally, the Small Business Specialist at each field installation can often provide useful guidance regarding a firm's prospects for doing business with that installation.

Another useful source of procurement information is NASA's Annual Procurement Report. Summary data are presented on all procurement actions for the preceding fiscal year, with numerous tabulations reflecting awards to small versus large business, competitive versus noncompetitive awards, new contracts versus contract modifications, etc. A list of the one hundred largest contractors according to net value of direct contract awards from NASA is also included. Although the report describes the preceding year's procurement statistics, it is a good general guideline for approximating

near term future expenditures. The most recent Annual Procurement Report is available from NASA Headquarters, Office of Procurement, Washington, DC 20546.

Once a company determines that NASA does represent a viable market, there are several approaches which can be pursued simultaneously to increase the likelihood of finding specific procurement opportunities.

Get on the Bidders List

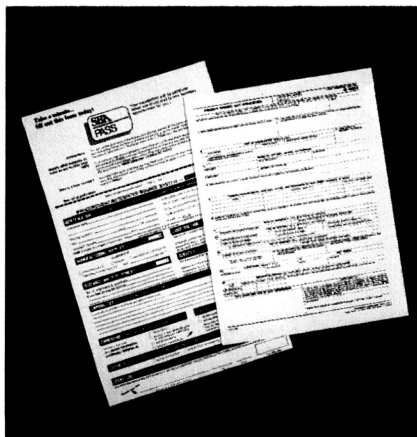
As mentioned in Chapter 2, NASA often uses an internal bidders mailing list to identify potential bidders for a procurement. Since every NASA installation maintains its own list, it is essential to apply *individually* to each installation at which a company hopes to do business. The application consists of a Standard Form 129 generally describing the company, as well as more specific information regarding the products and/or services a firm provides. There are special forms for architect

and engineering firms. The tear-out card at the back of this publication may be used to request application forms for each NASA installation.

In most cases, prospective contractors should also submit bidders mailing list applications to other Government agencies active in their field of interest. Information on appropriate procedures is normally available from each agency's Small Business Office. Two government-wide lists of particular interest are the Small Business Administration's Procurement Automated Source System (PASS), and the Minority Business Development Agency's (MBDA) PROFILE System. PASS is used by many agencies to supplement their in-house lists, and all small businesses are invited to be included in the system. PROFILE is also used Government-wide but is limited to minority-owned companies. Further information on PASS may be obtained from the nearest SBA office; information regarding PROFILE is available from any MBDA Regional Office (see Chapter 6).

Firms which market standard commercial products likely to be used by several Government agencies should also be sure their products are included on the Federal Supply Schedule. The Schedule is updated annually, and application procedures may be obtained from the General Services Administration Business Service Centers described in Chapter 6.

It is important to respond to every solicitation received as a result of being on a bidders list, even if no bid or proposal is offered. A simple post-card or letter indicating "no bid" will suffice. Otherwise, a firm might be dropped from the list without notice. Likewise, it is advisable to keep a record of addresses to which applications have been sent, so they may be updated as the need arises.



Getting on Bidders Lists by submitting forms such as these is a very important step in the marketing process.

Careful preparation, checking and re-checking of proposals is a must to avoid costly errors as well as present the best possible offer.

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Review the Commerce Business Daily

Because there are sometimes more companies in NASA's source system than are necessary to achieve adequate competition, it is not safe for a company to assume that because they are listed in the system they will be notified of every procurement in their field. However, by reviewing the Commerce Business Daily (CBD) each day, firms can identify interesting solicitations as they are issued, and request copies of those on which they would like to bid. Generally, all procurements over \$10,000 (or \$25,000 for construction) are synopsized in the CBD. It is almost essential for any company seriously interested in marketing to the Government to regularly review the CBD. Subscriptions may be obtained from the Superintendent of Documents, Government Printing Office, Washington, DC 20402, and the publication is also available in most public libraries.

Direct Marketing

One of the most productive techniques for identifying procurement opportunities within NASA is via direct contact with technical requirements personnel. Although this can be somewhat expensive and time-consuming, and does not in any way guarantee a contract or influence the competitive selection process, it does enable contractors to develop an early and thorough understanding of NASA's requirements. This is especially important in research and development, where long-range planning and the allocation of a company's resources are essential. NASA's technical and procurement personnel welcome inquiries and discussions with appropriate company representatives. The Small Business Office at each Center will be pleased to arrange such visita-



tions or respond to written inquiry.

The annual Research and Technology Objectives and Plans Summary and the NASA Program Plan described in Chapter 5 are additional valuable sources of information for determining technical areas of interest and who to contact within NASA. Inquiries of a general nature or with NASA-wide implications should be addressed to the Director, Office of Small and Disadvantaged Business Utilization, Washington, D.C. 20546.

Preparation of Proposals

The preparation of an effective proposal is perhaps the most important part of the marketing process. As a general rule, companies which are not familiar with preparing proposals for Government contracts should seek professional assistance, appropriate to the complexity of the procurement and its potential value to the company. University or private consultants, and in some cases local business assistance centers, are possible sources of such assistance. Many universities also teach evening courses or sponsor seminars on preparing proposals. It is well beyond the scope of this publication to present thorough guidelines on this complicated subject. However, the following information may be useful to acquaint firms which are inexperienced in Government contracting with some very basic requirements.

First and foremost, the instructions as stated in the solicitation must be followed *exactly*. Extreme

care should be taken to fully respond to every requirement in the exact detail called for. Delivery quantities, dates, terms, conditions, product specifications, company representations, certifications, acknowledgements, signatures and everything else requested in the solicitation must be provided in the proper format. The proposal or bid *must* be submitted on time. Technical proposals, which are typically required in NASA procurements, must adequately address each issue identified in the request for proposals. It is imperative to remember that the selection process only allows for consideration of what is properly presented in the proposal or bid, and does not consider outside factors, no matter how obvious.

The relative lack of flexibility in Government procurement, even under negotiated contracting procedures, is often difficult for inexperienced contractors to understand. Many contracts have been lost because a bid arrived as little as one minute too late, or because a proposal failed to sufficiently respond in an area where it was obvious the company had substantial expertise. Nevertheless, the procurement regulations have been established to ensure fair and equitable treatment for all companies bidding on Government contracts, and are therefore rigidly enforced without exceptions for "extenuating circumstances."

All questions regarding a specific procurement should be addressed to the contracting officer identified in the solicitation. Although it may

appear more convenient or direct to seek guidance from the technical project office, the contracting officer is the only official authorized to represent the Government in procurement matters.

Copies of NASA publications and technical specifications when referenced in solicitations and contracts may be obtained through the NASA contracting office. Other sources for federal or military specifications are contained in the Index of Federal Specifications and Standards, and the Department of Defense Index of Specifications and Standards. These documents may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

All firms, but particularly small firms with limited resources, should be judicious regarding the solicitations on which they bid. The process of preparing a high quality proposal is expensive and time consuming, especially in the R&D procurements frequently sought by NASA. Firms generally stand a better chance of obtaining a contract by emphasizing proposals on projects closely aligned with their capabilities, as opposed to trying to "blanket the market" by bidding on everything remotely related to their field. While this latter approach may eventually lead to an award, it is more likely to result in a series of unproductive and frustrating experiences for both NASA and the contractor.

In the event that a firm submits an unsuccessful bid or proposal, it has the right to know why. It is NASA policy that on written request, unsuccessful offerors will be debriefed after contractor selection has been announced, but normally prior to contract award. In sealed bid procurements, in which selection is predominantly based on price, debriefing is essentially accomplished at the public bid opening. The request for debriefings or attendance at bid

openings should not be regarded as establishing an adversarial relationship between NASA and the contractor; rather, it is an important part of the learning process which enables a company to submit a better proposal the next time. Small, inexperienced firms should make a special effort to understand the weaknesses in their proposals in order to become more competitive in future procurements.

Unsolicited Proposals

Although most NASA R&D contracts are awarded via standard competitive procurement procedures, another important method of doing business with NASA is through the submission of relevant new ideas and concepts in the form of unsolicited proposals. An unsolicited proposal is a written offer to perform a task or effort, prepared and submitted by an organization on its own initiative without a formal solicitation from NASA. In general, most appropriate for the unsolicited approach is research of a fundamental nature—that which bears potential for advancing the state of the art in a particular area, contributes to knowledge of a specific phenomenon, or provides fundamental advances in engineering or the sciences. In addition, proposals may define problems and present possible solutions to the problems, developmental or otherwise, which are within NASA's areas of concern.

When an organization wishes to pursue a specific research project, it is advisable to determine if the contemplated study is within NASA's scope of interests, through such sources as the open literature, published NASA testimony before Congressional Committees, or direct contacts with NASA technical personnel. However, the existence of an apparent mutual interest does not, in itself, mean NASA will support an

unsolicited proposal. NASA must consider such additional factors as the technical merits of the proposal, the availability of funds, and the relative priority of the project as compared with other alternatives under consideration.

Another source of information on NASA programs is through the issuance of periodic notices in the form of "Dear Colleague" letters, which disseminate information to members of the scientific and engineering community. They outline general research areas in which unsolicited proposals would be of interest, but do not present any statement of specific NASA requirements. Requests to be placed on the mailing list for these announcements should be addressed to NASA, Office of Space Science and Applications, OSSA Steering Committee, Code EP, Washington, DC 20546.

Proposers should be aware that in most cases cost sharing by non-Federal organizations is statutorily required in any contract for research which results from an unsolicited proposal. However, exceptions for educational institutions and other organizations are possible in certain circumstances.

Guidelines for the preparation and submission of unsolicited proposals may be obtained by writing to the Small Business Specialist at any NASA Installation.

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Small companies are encouraged to visit with NASA Small Business Specialists to describe their capabilities and learn about special assistance programs for which they qualify.



The primary objective of Government procurement is to obtain required goods and services at a fair price. In many cases, however, other objectives are achieved simultaneously. To ensure that all businesses have an equitable opportunity to participate in Federal procurement, a number of special assistance programs have been established. These include various types of preference programs, such as small business set asides and programs exclusively for minority-owned companies, as well as other forms of assistance generally designed to help companies that otherwise

might not be able to compete for a share of Government contract awards. All firms are encouraged to become familiar with and take advantage of any of the special assistance programs for which they qualify. This chapter is intended to be an introduction to some of the major programs primarily available to small and disadvantaged businesses.

Special Assistance Programs

Small Business Set Asides

Early in the acquisition process, all proposed NASA procurements are reviewed for the participation of small businesses. A business qualifies as being small if it, including its affiliates, is independently owned and operated, is not dominant in the area of business in which it is bidding on Government contracts, and meets certain other size-standard criteria established for each industry by the Small Business Administration (SBA). Size standards are published in the regulations of SBA (Title 13, CFR Part 121). Automatically, procurements under \$10,000 which are subject to small purchase procedures are reserved exclusively for small business. Additionally, certain classes of acquisitions are frequently set aside for bidding by small concerns, based on past experience with particular items. Often, individual procurements are also set aside when it appears that adequate competition would result if bidding on the required goods and services was limited to small businesses.

In some instances, portions of large procurements may be set aside for exclusive small business bidding. The extent, if any, to which individual procurements are set aside and the applicable size standard are indicated in both the solicitation document and in the *Commerce Business Daily* announcement. Even if a procurement is not set aside, small firms are encouraged to compete and are included in each competitive solicitation when their capabilities so indicate.

Small Business Innovation Research

A special Government program to assist small research and development companies was initiated in 1982 in response to the Small Business

Innovation Development Act. Participating agencies, including NASA, are required to conduct a Small Business Innovation Research (SBIR) program by reserving a percentage of their R&D budgets to be awarded to small businesses through a three-phase process. The objectives of the program are to stimulate technological innovation in the private sector, strengthen the role of small business in meeting Federal R&D needs, increase the commercialization of innovations derived from Federal R&D, and encourage minority and disadvantaged business participation in technological innovation. Although there are some differences among agencies, the three-phase process is generally as follows:

Phase I: Awards of up to \$50,000 are made for research projects to evaluate the scientific and technical merit and feasibility of an idea.

Phase II: As a result of Phase I, those projects with the most potential are funded for one or two years up to \$500,000, to further develop the proposed ideas to meet the agency's needs.

Phase III: Private-sector investment and support are anticipated to bring an innovation to the marketplace. When appropriate, this phase may also involve follow-on production contracts with a Federal agency for future use by the Federal Government. Otherwise, there is no Federal SBIR funding in Phase III.

More information on NASA's SBIR program can be obtained by writing to the SBIR Program Manager, NASA Headquarters, Washington, DC 20546.

Minority Business Enterprise

NASA's Minority Business Enterprise Program is directed toward ensuring the equitable participation of minority firms in NASA prime and sub-contract opportunities. In keeping with national policy, NASA works closely with the Small Business Administration (SBA) in assisting small firms owned and controlled by socially and economically disadvantaged individuals. Socially disadvantaged individuals, for government procurement purposes, include (but are not limited to) Black Americans, Hispanic Americans, Native Americans, Asian Pacific Americans, Asian Indian Americans and other minorities, or any other individual as designated by the SBA. Economic disadvantage relates to the assets and net worth of individuals, as well as their relative access to capital and credit opportunities, as prescribed by the SBA. Under the provisions of Section 8(a) of the Small Business Act, the SBA may enter into contracts with NASA and other Government agencies for supplies and services, and then subcontract noncompetitively for these requirements with SBA approved small disadvantaged firms. NASA gives special emphasis to identifying procurement requirements for referral to the SBA for matching with the capabilities and potential of approved Section 8(a) firms. Qualifying firms interested in participating in this program should contact the nearest SBA office, in addition to making their capabilities known to NASA.

Labor Surplus Area Set Asides

Under this program, competition for contracts is restricted to firms with production facilities in labor-surplus areas (areas of higher than average unemployment) even if their headquarters is not located in such

NASA is interested in expanding its source lists to include more women-owned firms with technical expertise.

areas. The firms must agree to perform most of the contract work in the labor surplus areas. Contracts are set aside when enough qualified firms are expected to bid to ensure that awards will be made at fair and reasonable prices.

The U.S. Department of Labor defines and classifies labor surplus areas. For current information on qualifying areas, consult the publication, "Area Trends in Employment and Unemployment," available from the Superintendent of Documents, Government Printing Office, Washington, DC 20402.

Women-Owned Businesses

Executive Order 12138 of May 18, 1979, requires Federal agencies to take affirmative action in support of businesses owned by women. To carry out this order, NASA makes special efforts to advise women of business opportunities and preferential contracting programs for which they may be eligible. Bidders mailing lists are reviewed to ensure a fair representation of women-owned firms, and special conferences are sponsored to assist companies owned and controlled by women in the process of doing business with NASA.

Subcontracting Opportunities for Small Business

Subcontracting with NASA prime contractors is an important source of revenue for many companies, both small and large. For example, of the \$5.6 billion awarded to prime contractors in FY 83, \$1.9 billion was channeled on to subcontractors, with over \$.6 billion going to small businesses. Typically more than half of the total NASA dollars flowing to small businesses have been awarded via subcontracts. Thus, the development of sound marketing strategies to seek out subcontracting oppor-



tunities should be an integral part of a company's overall plan to sell to the government.

Recognizing that small firms often do not have the capability to perform as a prime contractor on the larger procurements, NASA actively promotes the involvement of small business at the subcontract levels. Special contract clauses are included in most NASA prime contracts which require the prime contractor to maximize small business and minority business subcontracting opportunities. Small business firms are therefore encouraged to identify their capabilities to NASA's major prime contractors.

There are several useful sources of information to assist small businesses in determining appropriate prime contractors to contact. One of the best is the *Commerce Business Daily*, which publishes information on unclassified contract awards exceeding \$25,000 in value for civilian agencies and \$100,000 for military agencies. The Small Business Administration and the Department of Defense publish directories of major Government contractors which appear to offer the greatest potential for subcontracting to small business concerns. In its Annual Procurement Report, NASA also publishes a list of the top 100 contractors ranked according to the amount of NASA contract awards. Most of the major prime contractors have small business representatives assigned to assist small companies in understanding and responding to the needs of the prime, and many produce special publications which can be help-

ful. Finally, the Small Business Specialist at each NASA installation will provide guidance to small businesses seeking subcontracting opportunities.

Procurement Conferences

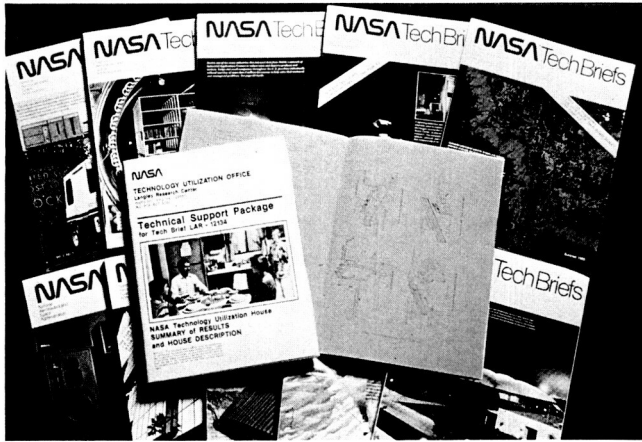
NASA is an active participant in the Federal Procurement Conference program sponsored by the Department of Commerce predominantly to assist small business. At these conferences, NASA representatives counsel many of the participants on a one-on-one basis. In addition, there are follow-ups between NASA representatives and the small businesses to assist them in their marketing with appropriate NASA technical personnel. NASA Small Business Specialists at all of the field centers also work very closely with the local Chambers of Commerce and trade associations to advise them of NASA's needs and to aid interested firms in informing NASA of their capabilities and expertise.

Other Forms of Assistance

While the following programs are not related to procurement assistance, *per se*, in many cases they offer special or unique opportunities which small businesses are encouraged to take advantage of.

Rights to Inventions and Data

The rights to inventions made under NASA contract and the licensing of NASA patents are governed by stat-



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NASA Tech Briefs can be a valuable source of information and new product ideas for small companies.

ute, with special consideration given to small businesses. In general, a nonprofit organization or small business firm may elect to retain title to inventions made in the performance of work under a U.S. Government contract. Inventions made by larger business firms in the manner specified by the Space Act, on the other hand, become the exclusive property of the Government, unless the NASA Administrator determines that the interests of the United States will be served by waiving all or any part of the Government's rights. In all cases, full disclosure to NASA of inventions funded by the agency is required.

It is NASA's general policy to acquire for the Government unrestricted rights to all data first produced under NASA contracts. Under certain circumstances, NASA may grant the contractor the right to copyright such data, reserving a free license under the copyright to the Government.

Detailed information concerning these policies and procedures, as well as forms for petitioning for

waivers of rights to contract inventions, and for making application for licenses under NASA patents, are available from the Office of General Counsel, National Aeronautics and Space Administration, Washington, DC 20546.

Monetary Awards

Although not limited to small businesses, Section 306 of the Space Act of 1958 authorizes the Administrator of NASA to make monetary awards to individuals or organizations for scientific or technical contributions "having significant value in the conduct of aeronautical or space activities." Such contributions include inventions and innovations which have been used and have proved to be of verifiable value to NASA. Many qualified contributions have been produced during the performance of contracts for NASA. For information concerning the criteria for eligibility and the procedure for submitting an application for award, write to Staff Director, Inventions and Contributions Board, National Aeronautics and Space Administration, Washington, DC 20546.

Access to Technical Information

The results of NASA research and development can often be applied by small businesses in unique and profitable ways. Numerous new products, processes and solutions to technical problems have been discovered and are available for further development. This information is distributed by NASA's Technology Utilization Program in several forms:

—NASA Tech Briefs is an indexed, quarterly journal containing articles on innovations and improved products or processes developed for NASA which are thought to have commercial potential. Articles are grouped into nine broad technical

categories and special sections are included for books and reports, computer programs and new product ideas. Information on NASA's patent licensing program and additional services of the Technology Utilization Program are also described. NASA Tech Briefs is currently distributed free to qualified companies. Requests may be directed to the address at the end of this section.

—Seven Industrial Applications Centers (IAC) have been established by NASA to assist small business and the nonaerospace industrial sector in making profitable use of new knowledge resulting from aerospace research and development. Each IAC is based at a university or a not-for-profit research institute, and is staffed with specialists skilled in the use of computer search and retrieval techniques. A modest fee is charged for a wide variety of services offered to IAC clients.

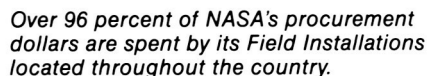
—The Computer Software Management and Information Center (COSMIC) is located at the University of Georgia. COSMIC collects all of the computer programs NASA has developed (and also some of the best programs developed by other Government agencies), verifies that they operate properly, and makes them available at very reasonable prices. Program documentation is also available for evaluation of programs prior to purchase. A complete catalog of computer programs offered by COSMIC may be purchased, or individual searches for relevant programs will be performed by COSMIC upon request.

More information on the services and elements of NASA's Technology Utilization Program may be obtained by writing to: Director, Technology Utilization & Industry Affairs Division, NASA Headquarters, Washington, DC 20546.



Procurement conferences allow small firms to meet with many key Government representatives and efficiently gather a wealth of information regarding Federal procurement programs.

custodial and other services. It is important, therefore, for companies marketing to NASA to become familiar with the activities and needs of each installation with which it hopes to do business. This is especially true for technical or research and development firms. While all NASA centers buy similar everyday items associated with office operation, facilities maintenance and construction, etc., the technical procurement requirements of each installation vary widely. This chapter briefly summarizes the major research programs and fields of interest at individual NASA centers.



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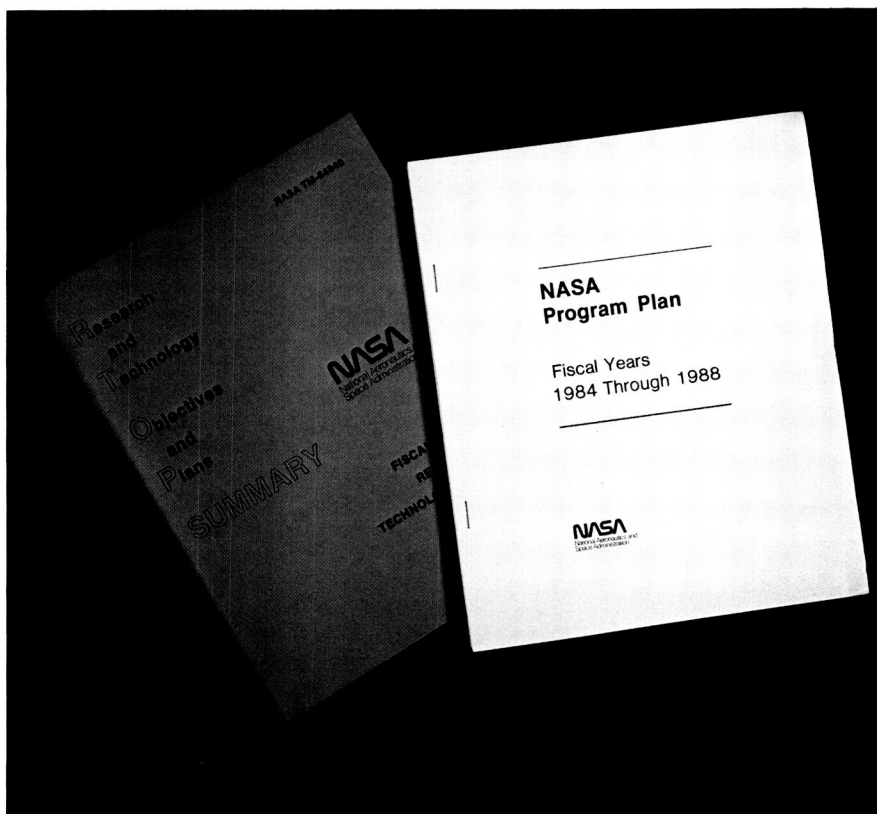
NASA Field Installations

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Summaries of Research Interests

NASA publishes an annual compilation of its funded research and technology programs in abstract form as the Research and Technology Objectives and Plans Summary (RTOP). The RTOP Summary is designed to facilitate communications and coordination among concerned technical personnel in government, industry, and universities. The publication briefly describes NASA's R&D objectives, identifies the installation of primary interest and provides a point of contact for technical information. The Summary should be especially helpful to small research firms in ascertaining NASA technical requirements. It is available from the NASA Scientific and Technical Information Facility, P.O. Box 5787, BWI Airport, MD. 21240.

Another valuable source of information on NASA technical programs is the NASA Program Plan, also published annually. This comprehensive document presents NASA's planned program of aeronautics and space research and development for five years into the future. It is available for review in the libraries and Small Business Offices at all NASA installations, and will be provided to qualified companies with a demonstrated need upon written request to NASA Headquarters, Small Business Office, Washington, D.C. 20546.



The NASA RTOP Summary and Program Plans are very valuable sources of information on NASA's Research and Development activities.

Ames Research Center

Moffett Field, California



The National Full-Scale Aerodynamics Facility at NASA's Ames Research Center is the largest wind tunnel in the world.

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Building on a series of major accomplishments which extend from 1941, the Ames Research Center is continuing to pursue National goals in aeronautics and space. Among the NASA centers it is noted for its technical excellence in life sciences, human factors and man-machine interactions, fluid dynamics and heat transfer, aerodynamics and flight dynamics, flight stability and control, and technical project management. Its facilities of superior merit include wind tunnels, manned flight simulators, high enthalpy arc jets, a life sciences laboratory complex, airborne scientific laboratories, and very advanced, large scale scientific computational facilities.

As the NASA center with primary responsibility for research in the life sciences, Ames life sciences program covers many disciplines and research areas. Aeronautics life sciences studies the relationship of the human to the aviation system in order to develop advanced cockpit controls and displays and more realistic flight simulators, and to identify and resolve human factors problems affecting air safety. Biomedical research includes developing and operating hardware and experiments for determining the effects of space flight on non-human living organisms, and for providing information to solve space medicine problems. Advanced life support system research is conducted to develop techniques for sustaining human life and maintaining human efficiency in space. Extraterrestrial life detection studies are concerned with the origin of life and with the abundance and distribution of life and life-related compounds in space and on the other planets.

Ames researchers utilize a multitude of approaches in the study and advancement of aeronautics. Theoretical analyses and research in computer simulation and fluid mechanics are first performed, and are

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then verified in wind tunnels, including the massive 200,000 hp Mach 0.5 to 3.5 unitary plan tunnels. Flight concepts and characteristics of proposed aircraft are checked in actual flight with research aircraft, which can simulate the flight of a range of types of aircraft. Research pilots perform flight maneuvers on the ground in flight-motion simulators, which duplicate performance of planned new aircraft. Analytical and experimental work on guidance and control is done by other researchers. Currently, the areas of greatest interest in aeronautics are in development of vertical or short take-off and landing (V/STOL) aircraft and rotorcraft for urban regional transportation systems and for military aircraft applications, and in the development of the capability to calculate aerothermodynamic flow about aircraft.

Ames work in astronautics encompasses research in space sciences, earth applications, and spacecraft development. Associated technology

development in support of astronautics programs is concentrated on infrared sensors, cryogenics, atmosphere entry aerothermodynamics and thermal protection systems, and on computational chemistry.

Space sciences research includes astrophysics, astronomy, studies of planetary atmospheres, and climate and stratosphere research. Data for these studies are provided by aircraft, sounding rockets, balloons, and spacecraft. Earth applications is a program of research and development for the effective use of remote sensing technology for earth resources applications. The use of this technology is tested in a variety of users' settings—both regional and institutional. Emphasis is placed on improving the techniques for extracting useful information from remotely sensed data. Spacecraft development includes the conception, development, and operation of infrared telescopes and planetary atmosphere probes.

NASA's Quiet Short-Haul Research Aircraft is representative of Ames' work in the advancement of aeronautics.

detection and monitoring of the Earth's limited natural resources.

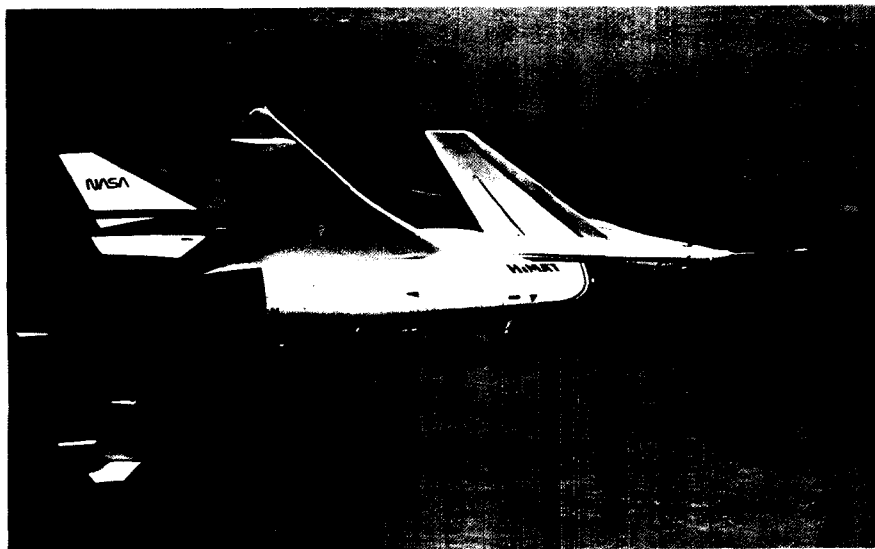
the data from the instruments aboard the Landsat-4 Satellite.

Flight Operations— Dryden Flight Research Facility

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Located in California's Mojave Desert, Dryden supports the landing, servicing and ferry preparation of the Space Shuttle utilizing a specially-equipped 747 pictured above center.



Beginning with man's first attempt to fly faster than the speed of sound, NASA-Ames Dryden Flight Research Facility, formerly Dryden Flight Research Center, has played an important role in establishing this country's leadership in world aeronautics. Excellent weather and a vast dry lake bed at the Dryden location at Edwards, California, create near-perfect conditions for conducting flight research. In addition to the famous X-series research aircraft and the wingless lifting bodies, experimenters at Dryden have flight tested a wide variety of experimental aircraft.

The mission of the Dryden Flight Research Facility is the conduct of research on flight, and the problems of manned flight, within the atmosphere. This work includes effort on problems of takeoff and landing, low-speed flight, supersonic and hypersonic flight, and re-entry in order to verify predicted characteristics and to identify unexpected problems in actual flight.

Dryden has contributed considerably to safety and economics of flight testing high risk vehicles by developing and using the RPRV, or Remotely Piloted Research Vehicle. These are small scale versions of regular aircraft and are piloted from ground-based cockpits via radio uplinks. HiMAT, for Highly Maneuverable Aircraft Technology (testing complex maneuvering in high G situations), and DAST, Drones for Aerodynamic Structural Testing, (testing experimental wing shapes) are two of Dryden's best known remotely piloted vehicles.

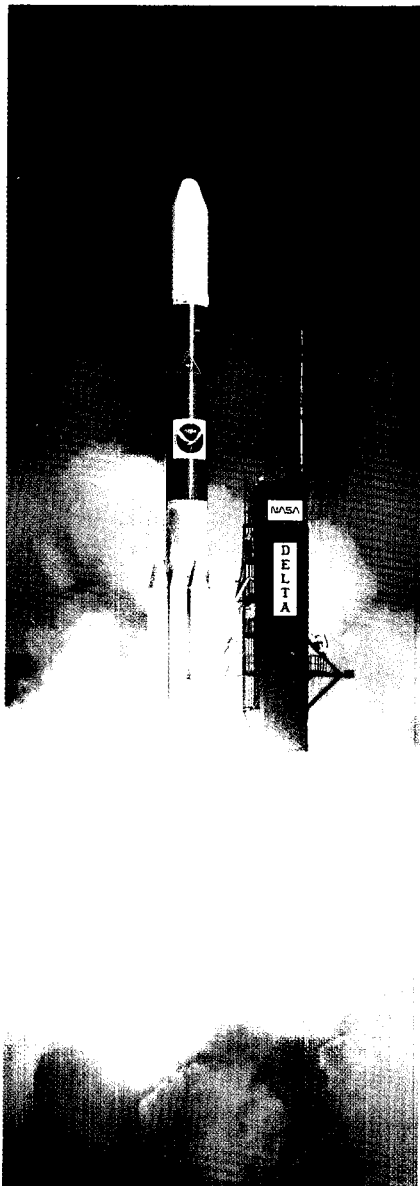
The Small Business Specialist at Ames Research Center is available to help firms in identifying potential procurement opportunities at both Ames and DFRF, and encourages inquiries from interested companies.

The HiMAT is one of Dryden's best known remotely piloted vehicles.

Goddard Space Flight Center

Greenbelt, Maryland

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The third in a series of improved GOES satellites, launched aboard a Delta launch vehicle, will help provide timely global weather information.

The Goddard Space Flight Center (GSFC) was established as a major eastern field center of the National Aeronautics and Space Administration in 1959. A modern, campus-like complex of 36 buildings, the Center is situated ten miles northeast of the nation's capital on about 1,100 acres in Greenbelt, Maryland. Staffed by more than 3,500 government employees and some 2,000 contractor personnel, the Goddard team is made up of some of the world's leading groups of scientists, engineers, technicians, and administrative managers devoted to research in space science and applications, and space tracking and communications.

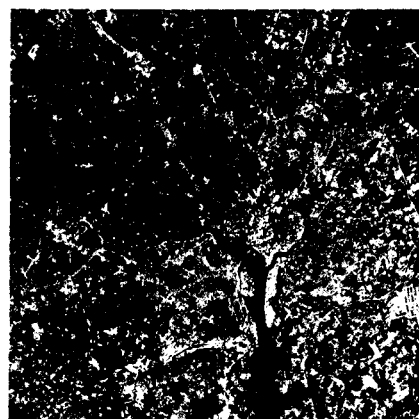
GSFC has been assigned the prime responsibility within NASA for the management of application satellite projects, unmanned scientific satellite projects, and worldwide NASA tracking and data acquisition operations. It is one of the few installations in the world capable of conducting a full range space-science experimentation program from theory, through experimentation, design and construction, satellite fabrication and testing, tracking, data acquisition and reduction.

The Center's scientific staff is concerned primarily with research into magnetic fields, energetic particles, ionospheres and radio physics, planetary atmospheres, meteorology, inter-planetary matter, solar physics, communication, and astronomy.

The satellite and sounding rocket projects at Goddard advance our knowledge of the Earth's environment, Sun/Earth relationship, stars, galaxies, and the physical makeup of the universe. Applications spacecraft projects are advancing technology in such areas as communications, meteorology, navigation, pollution monitoring, and the detection and monitoring of the Earth's limited natural resources.

From the applications satellite program emerged the Landsat program, which is an updated version of earlier Nimbus experimental weather satellites and the Tiros operational (weather) satellite system. Landsat scans the Earth's surface every 18 days gathering a wide range of Earth resources survey information. Another application satellite is the Geostationary Operational Environmental Satellite (GOES), previously known as the Synchronous Meteorological Satellite. Timely global weather information, including advance warning of developing storms, is a primary function of this satellite, which transmits black and white, television-like images of one third of the Earth every 30 minutes, day and night.

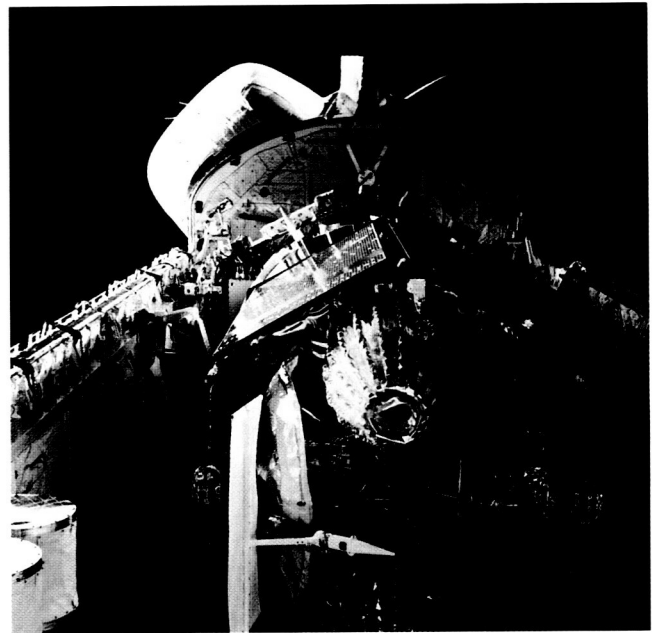
A succession of spacecraft based on Goddard-developed technology have been placed into geosynchronous orbit, making global satellite communications an everyday reality. Four Intelsat IV's, which are geostationary over the Atlantic, Pacific and Indian Oceans, serve more than 106 nations around the world. Canada's ANIK I and II plus Western Union's WESTAR A and B are examples of



Natural color image of the Washington, DC area, from the Thematic Mapper aboard the Landsat-4 Satellite.

The stowed Tracking and Data Relay Satellite and its inertial upper stage aboard the Challenger on its first day in space.

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technology utilization having its development roots at Goddard.

The GSFC's Applications Technology Satellite-6 (ATS-6) is the culmination of state-of-the-art communications satellite techniques. ATS-6 is currently transmitting educational, medical, and experimental programs throughout remote regions of the United States and developing nations.

Goddard is responsible for the management and operation of the worldwide NASA Spaceflight Tracking and Data Acquisition Network supporting both manned and unmanned missions, primarily in near earth orbit and at lunar distances. The mission control centers for the network and for the individual projects are located at Goddard. The NASA Communications Network is the voice communications system between the network stations, the mission control centers, and both the manned and unmanned spacecraft.

A new generation in satellite tracking systems is currently being developed by Goddard. The system is called the Tracking and Data Relay Satellite System (TDRSS). The TDRSS is a concept which places the tracking station in space in geosynchronous orbit, and thus, in effect, looks down at orbiting satellites. The TDRSS will permit greatly expanded satellite coverage and will be capable of handling the high data rates of future missions such as Landsat D and Spacelab. The TDRSS satellites will communicate data back to a ground station in White Sands, New Mexico, thus

worldwide ground based network.

Another major mission at Goddard is project management of the reliable Delta launch vehicle which has placed into orbit more than 150 successful unmanned satellites for NASA, other Federal agencies, domestic communications corporations, and numerous foreign countries.

Much of Goddard's theoretical research is conducted at the Goddard Institute for Space Studies, in New York City. Operated in close association with the academic community, the Institute provides supporting research in geophysics, astrophysics, astronomy and meteorology to NASA and Goddard. Special emphasis in the meteorological area is now being placed on participation in the Global Atmospheric Research Project, leading to more accurate long range weather forecasting on a global basis.

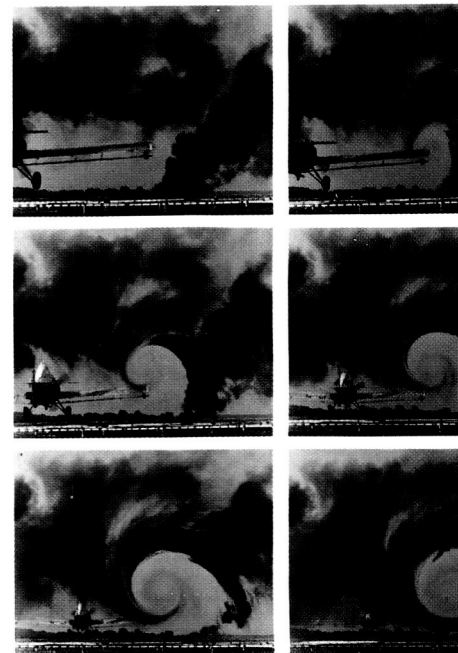
Goddard is also the home of the National Space Science Data Center. This facility is the central repository for the scientific data collected from space science experiments.

In October 1981, GSFC was consolidated with the Wallops Flight Facility. The facilities at Wallops are utilized by scientists and engineers from laboratories and research centers of NASA and other government agencies, colleges and universities and the scientific community world-wide.

Goddard's Wallops, Virginia launch range provides vehicle assembly and launch facilities, communications, tracking instrumentation, data acquisition and data

lites launched from Wallops Island and other off-site locations. To date, 12,000 rocket propelled space flight experiments have been conducted.

In order to maintain its active support of small and disadvantaged businesses, Goddard maintains an automated source system comprised of approximately 4,000 firms. The Center encourages businesses to submit a Bidders Mailing List Application (SF129) to be added to the Goddard Automated Source System, and to contact the Small Business Specialist for advice on procurement opportunities.



Wake vortex research at Wallops is used

Johnson Space Center

Houston, Texas

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The Lyndon B. Johnson Space Center is a focal point of the nation's manned spaceflight activities, including spacecraft development, program management, crew training, space flight operations, and related medical research and life sciences. The Center is also responsible for conducting investigations of lunar science, space science, and earth resources technology and application. The major programs which have been assigned to JSC include Mercury, Gemini, Apollo, Skylab, Apollo/Soyuz, Space Shuttle, Earth Resources, and Space and Life Sciences. JSC is currently

involved in planning for the design and development of a space station to accommodate man's permanent presence in space.

In addition to its facilities at Houston, JSC also operates the White Sands Test Facility near Las Cruces, New Mexico, for testing propulsion and power systems, and special testing of materials, components, and subsystems using hazardous propellants and other fluids.

All of JSC's programs involve tremendous amounts of materials and services which must be obtained from outside the Government. Many opportunities exist for small busi-

ness enterprises to participate in the furnishing of these requirements. Material needs range from raw materials and commercial items to sophisticated spacecraft, while services range from housekeeping to engineering, medical, and scientific capabilities. The Small Business Specialist at JSC serves as a focal point to assist companies in understanding the center's needs.

Continuing requirements exist in support of the following programs:

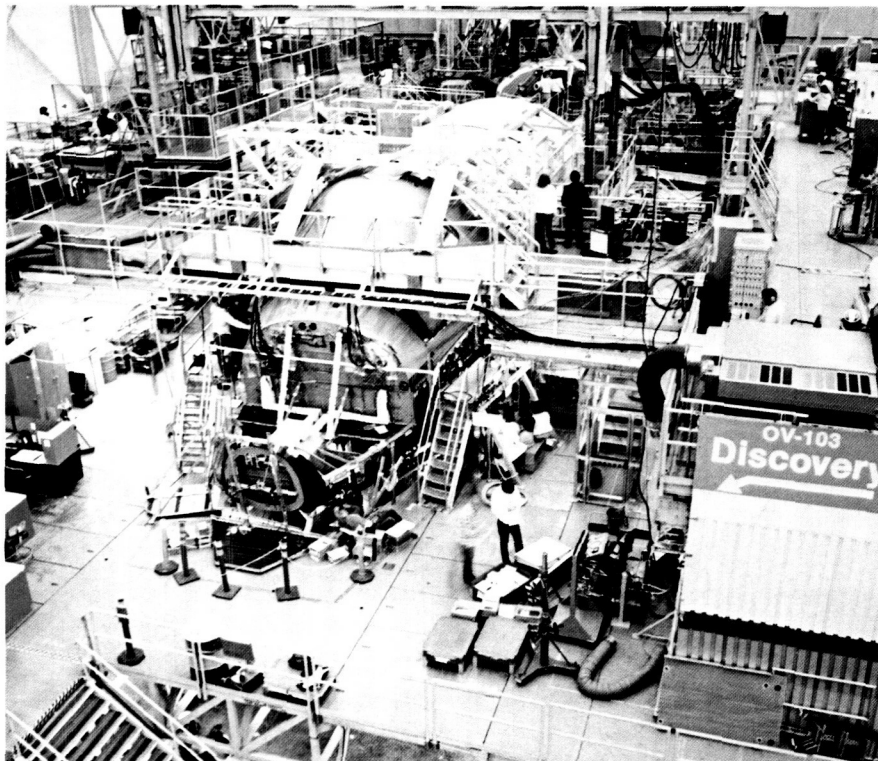
- The Space Shuttle Orbiter is a reusable space airplane that carries satellites and scientific payloads



Much of the 1625-acre Johnson Space Center is visible in this aerial scene (a Saturn V display can be seen at left center).

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Orbiter OV-103 (Discovery) as it was being constructed at the Rockwell International Palmdale California facility.



into orbit. It can also serve as a service platform for repairing satellites in orbit or can be used to bring them back to earth for repair. JSC is lead center for the Space Shuttle, which is now operational. The Space Shuttle is an element of the Space Transportation System, which is a standardized, yet flexible system capable of accommodating a wide variety of payloads and types of missions. Other elements include payload supporting systems such as Spacelab, and upper stages. The Spacelab is a joint venture between NASA and the European Space Agency to produce and operate in space a reusable laboratory that will be available to an international community of users in applied sciences, life sciences, and advanced technology. A schedule of user charges has been developed for the Space Transportation System which allows equitable payment for use and services by other agencies and nations as well as commercial enterprises.

— NASA's Earth Resources Program is part of the experimental Federal Earth Resources Survey Program. Applications include techniques for improved identification and use of mineral and land resources, marine and water resources, mapping and charting, urban land use, and agricultural and forestry resources. JSC is responsible for developing NASA's integrated plan for Earth resources activities. In addition, the Center manages data reduction from Earth

resources satellites, and evaluates the practicality of implementing various Earth resource survey systems which appear to be technically feasible.

— The Space and Life Sciences Program includes life sciences, medical research, science experiment developing, science payload management, lunar and planetary science, and space sciences. JSC is NASA's lead center for development and managing life sciences experiments to be carried aboard Shuttle and

other future space flight programs. The Center also manages the development and integration of experimental instrumentation and support equipment for use in space and life science programs; conducts biomedical research on the physiological stress of space flight on man; develops technology and instrumentation to maximize crew efficiency, reliability, comfort, and safety in space flight; and manages NASA's programs to assess the environmental impact of space systems and operations.



Mission Control Center at JSC during one of the first major in-orbit tasks of STS-5.

Kennedy Space Center

Kennedy Space Center, Florida

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The Columbia resting on top of the Boeing 747 Shuttle Carrier Aircraft waits to be demated in the mate-demate device at KSC.

The John F. Kennedy Space Center is the major NASA launch organization for both manned and expendable, or unmanned, space missions. As NASA's lead launch center, KSC launched the Apollo and Skylab space vehicles, the initial Space Shuttle vehicles, and is the primary landing site for Space Shuttle Orbiters upon completion of their missions. The Center also launches a wide variety of expendable spacecraft on an equally wide variety of missions, including earth orbital applications and scientific missions, and scientific probes to the far reaches of the solar system for exploration of other planets. In addition, the Center manages NASA launches conducted at the Western Test Range in California.

Supporting this primary mission are a host of technical and administrative activities, including design engineering, testing, assembly and checkout of launch vehicles and payloads and associated purchasing



Rockwell International technician mounting some of the 34,000 individual ceramic tiles which make up the Space Shuttle's thermal protection system.

and contracting. Technical and administrative support are provided in the following areas:

- (1) Programming, integrating and fulfilling user requirements for general-purpose facilities such as offices, warehouses, maintenance buildings, utilities and roads;
- (2) Designing and constructing all NASA facilities at the Center to meet users' functional requirements;
- (3) Integrating NASA ground support equipment at launch sites for various space systems;
- (4) Representing NASA in coordinating with the U.S. Air Force in matters pertaining to tracking and data acquisition involving space vehicles launched from the Center as well as from NASA facilities at the Eastern and Western Test Ranges.

All small and disadvantaged businesses are invited to contact the Small Business Specialist at Kennedy Space Center to discuss contracting opportunities.



An aerial view of the massive Vehicle Assembly Building at Kennedy Space Center.

Langley Research Center

Hampton, Virginia

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The Langley Research Center conducts extensive research in aeronautics, space technology, electronics, and structures. It also manages for NASA several aeronautics programs, small space projects and environmental monitoring investigations.

Aeronautics has been a Langley specialty for more than 65 years. Research in all aircraft speed ranges, from subsonic to hypersonic (ten times the speed of sound), accounts for about two-thirds of Langley's work. Specific programs concern improvements in the efficiency of transport aircraft, research of transonic transports, transonic and supersonic military aircraft and the technology for future transport and cargo aircraft. Langley is active in studies of hypersonic power plants and aircraft designs for future hypersonic aircraft, while work continues in general aviation airplanes and in vertical and short take-off and landing (V/STOL) commuter aircraft.

A cryogenic wind tunnel, called the National Transonic Facility, is an

important physical resource at Langley. Becoming operational in 1983, the facility is shared by NASA and the Department of Defense, and is available to other government agencies, industry and educational institutions.

Space technology research at Langley places strong emphasis on support of NASA's Space Shuttle and its payloads. Langley is responsible for one of the Shuttle's first major payloads, the Long-Duration Exposure Facility, which will place many kinds of simple experiments in Earth orbit for up to one year. Extensive Shuttle configuration work has been complemented by research in life support systems.

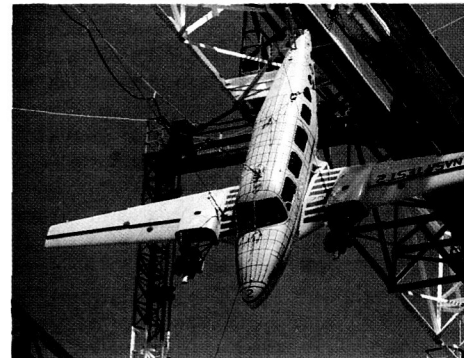
Langley also does major research in environmental, energy, and space science fields. Instruments to measure various elements and changes in Earth's atmosphere are developed and tested by Langley researchers. The center also manages the solid-fueled Scout launch vehicle, which places small payloads in Earth orbit or into deep space.

Langley's expertise in electronics may be NASA's strongest internal source of electronics technology. Instrument research supports automated data reduction for wind tunnels and other facilities. Increased emphasis on aviation electronics is exemplified by several small projects at Langley, all aimed at developing or improving air traffic control equipment and techniques. Research has increased in the development of application sensors, and Langley maintains a strong computer capacity to support advanced simulation work, analytical studies and data handling. A STAR computer system is the core of Langley's large computer complex.

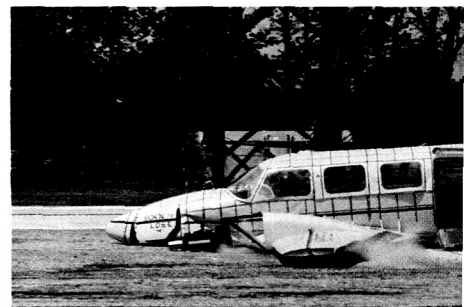
Langley's structures work is directed toward research in materials, structures and loads. Composite materials that can reduce weight in aircraft and Space Shuttle struc-

tures are of particular interest, as are thermal protection materials. Considerable research is done on high-temperature structures for Shuttle and other hypersonic vehicles and on developing improved computer design methods for large structural systems, such as space stations. Flight and landing loads, aeroelasticity and noise reduction are of considerable interest to Langley researchers.

Langley Research Center actively supports small and disadvantaged business participation in its procurement programs and encourages such companies to submit Bidders Mailing List Applications, as well as meet with the Small Business Specialist for assistance and advice.



Test aircraft are crashed under carefully controlled conditions at Langley's Impact Dynamics Facility to provide information which contributes to Langley's aeronautics programs.



NASA's newest wind tunnel, the National Transonic Facility at LaRC, provides a high-pressure, super-cold testing environment.

Lewis Research Center

Cleveland, Ohio

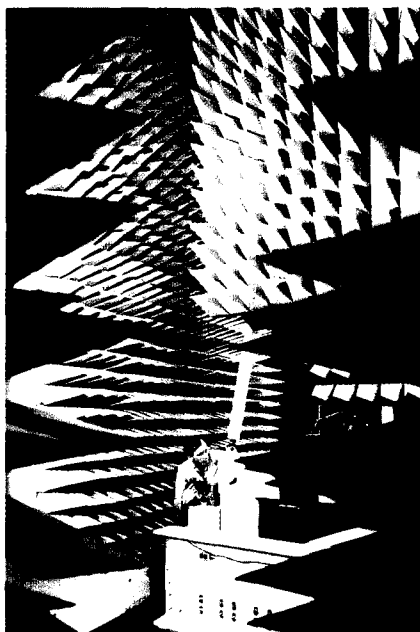
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Activities at NASA's Lewis Research Center are directed at advancing technologies for aircraft propulsion, propulsion and power generation for space flight, space communications systems, and new terrestrial energy systems and automotive engines. The Center also manages two major launch vehicles, the Atlas-Centaur and Shuttle Centaur.

Aeronautics activities at Lewis are aimed principally at development of engines which will operate as quietly, cleanly, and efficiently as possible. Propulsive lift concepts are being explored for aircraft which will take-off and land in short distances and will meet a need for short haul transportation. Specific projects include demonstration of a fuel efficient engine; a quiet, clean experimental engine for short-haul aviation; and an experimental, quiet, clean engine for general aviation. Research on propulsion for spacecraft emphasizes electric rocket engine technology, hydrogen-oxygen systems for the Space Shuttle, and other high energy propellants. Lewis scientists are also conducting studies pertinent to space communications, particularly at frequencies above 10 gigahertz and at high levels of transmission power.

In support of the Department of Energy's Solar Energy programs, NASA scientists are working on wind energy systems. Initial testing is on a 100 kw wind turbine, with larger sizes to follow. Solar photovoltaic arrays are also being tested and demonstrated. The object of this work is to reduce costs per kilowatt by technical advances, market development and expanded manufacturing.

Lewis engineers are also studying alternate fuels for jet aircraft, and are evaluating advanced energy conversion systems which use coal as fuel. Auto propulsion research is another area of experimentation. In addition, basic and applied research is



Foam cones on the walls of LeRC's Near-field Antenna Test Facility contribute to precise radio frequency measurements by absorbing radio waves, which prevents reflected waves from being measured twice.

An experimental, multi-blade swept-tip propeller is mounted atop a Lockheed Jet Star for noise testing in a Lewis program to develop advanced high-speed turboprops.

conducted on materials and metallurgy; cryogenic and liquid-metal heat-transfer fluids; pumps and turbines; combustion processes, propellants, tankage injectors, chambers and nozzles; seals; bearings, gears and lubrication; system control dynamics; plasmas and magnetohydrodynamics to simulate various flight conditions; and atmospheric wind tunnels and space environment facilities.

The Lewis Research Center provides many laboratories for physical, chemical, metallurgical, and electronics research. Test cells for engineering and component studies are provided air and exhaust from central supplies. Additionally, the Center maintains a number of large, specialized facilities for simulating the environments in which engines or spacecraft may be expected to operate: altitude chambers for full scale jet engines, a facility for high pressure and high temperature tests of turbines, large supersonic wind tunnels, thrust stands for chemical



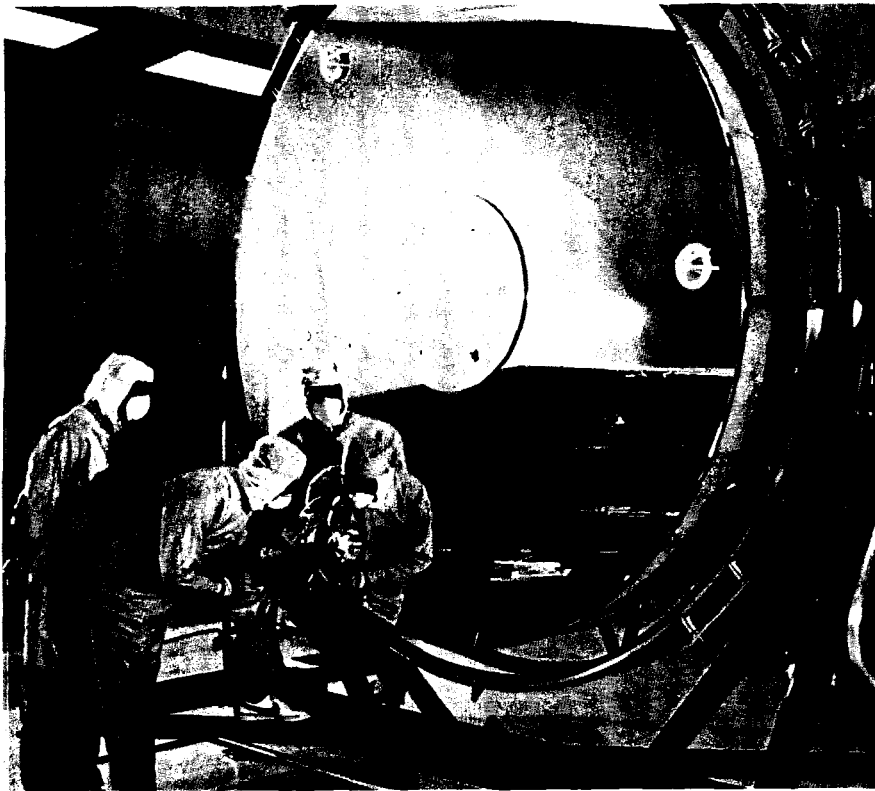
rockets, a 420-foot vertical tank for zero-gravity (free fall) tests, and large high-vacuum chambers with cryogenically cooled walls for simulating the space environment.

The diverse nature of the research activities at Lewis Research Center offer many and varied procurement opportunities for small and disadvantaged firms. These companies are encouraged to seek the assistance of the Lewis Small Business Specialist.

Marshall Space Flight Center

Huntsville, Alabama

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A coating of vaporized aluminum to enhance the reflectivity of the Space Telescope's eight foot diameter primary mirror is inspected (the project is managed by MSFC).

The Marshall Space Flight Center (MSFC) serves as one of the primary NASA centers for the design and development of space transportation systems, orbital systems, scientific and applications payloads, and other systems for present and future space exploration. Principal MSFC roles include rocket propulsion systems; design and development of manned vehicle systems; Spacelab mission management and payload definition; design and development of large, complex, and specialized automated spacecraft; and management of space processing activities. MSFC also has a primary role in the development and processing of science and applications experiments and for the conduct of energy-related system studies. In addition, MSFC conducts a vigorous research

and technology program and is involved in the study and definition of future programs, including the development of complex space structures, space propulsion systems, materials engineering, materials processing in space experiments, satellite power system definition, fundamental electronics, and payload systems analysis and integration.

Major programs of MSFC include:

—**Space Shuttle.** The primary design and operations goal for the Space Shuttle Program is to provide low-cost transportation to and from Earth orbit. The Center is responsible for the design, development, test, and evaluation of the Space Shuttle Main Engine, the Solid Rocket Booster, the Solid Rocket Motor, and the External Tank. Major Space Shuttle vehicle and component testing is also being conducted by MSFC.

—**SpaceLab.** MSFC has program responsibility for this major international cooperative program between NASA and the European Space Agency, being developed as a key element of the Space Transportation System. Designed as a versatile modular laboratory to be carried in the Shuttle Orbiter bay, the Spacelab provides manned modules (with a shirt-sleeve environment) and/or unpressurized instrument pallets suitable for conducting research and applications missions and Space Shuttle missions.

—**Spacelab Payloads Missions.** MSFC has mission management responsibility for the first three Spacelab missions and for partial payloads for future Shuttle missions. Mission management includes providing the focal point for planning, integration and operations, and for definition and development of instruments and

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The Spacelab, an international cooperative project between NASA and the European Space Agency, is shown in the cargo bay of the Orbiter Columbia.

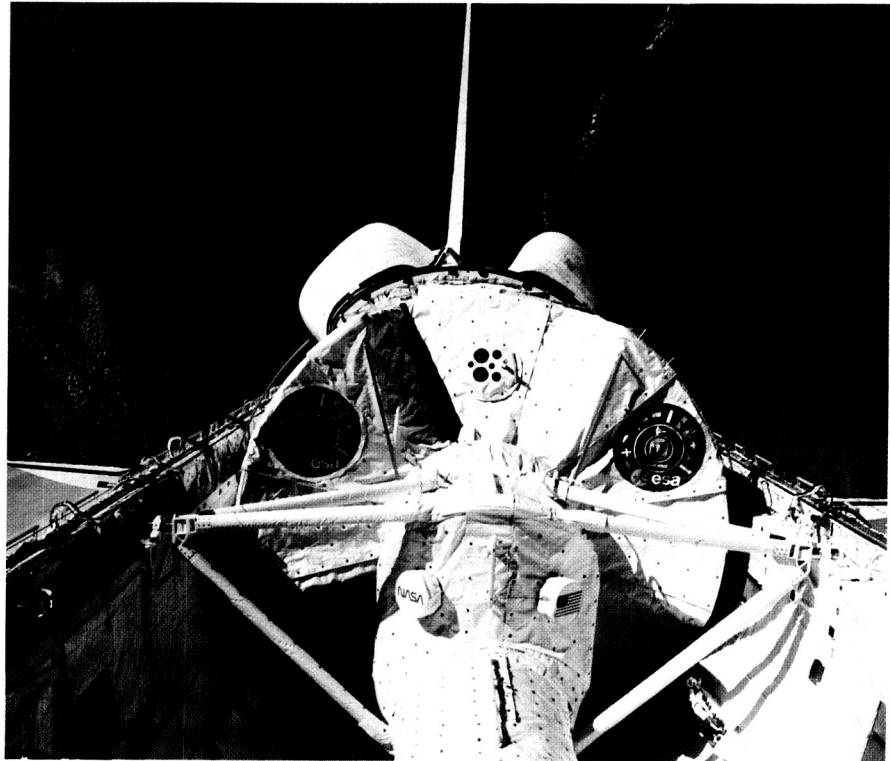
equipment, payload mission integration and operations, and maintenance of the interface between the user community and the Space Transportation System. The Center also has responsibility for development of certain Spacelab science and applications instruments, equipment and facilities.

— Materials Processing in Space.

MSFC is responsible within NASA for exploring and developing the potential for materials processing in space. The space environment offers to materials engineers a freedom from the influence of gravity that cannot be achieved on Earth for more than a few seconds. Growth of superior single crystals for solid state electronics, high-strength permanent magnet material, and separation of living cells for pharmaceutical products, all show great promise.

— Space Telescope. NASA's Space Telescope (ST) is a multipurpose optical telescope which, when placed in Earth's orbit, will enable scientists to observe objects in space that are 50 to 100 times fainter and approximately seven times further away than those now seen through the best telescopes on Earth. The ST will be launched by the Space Shuttle, which will also be used for orbital maintenance by astronauts. If extensive refurbishment should be required, the ST is designed for return to the ground by the Space Shuttle. Project management is assigned to MSFC.

— Inertial Upper Stage. The primary objective of this highly reliable, expendable upper stage system, which will be carried into orbit in the cargo bay of the Space Shuttle, is to deliver DOD and NASA spacecraft to high-energy orbits unattainable with the basic Space Shuttle capability. MSFC is designated the lead Center



for the Inertial Upper Stage for NASA use.

— Flight Experiments. The Marshall Center is active in the development of flight experiments for the Space Shuttle and other vehicles and currently has more than 30 experiments approved for flight. Examples include the study of gamma ray bursts and transients; evaluation of the potential for tracking and prediction of severe storms by satellite; materials processing; and experiments to determine the effects of long duration exposure of materials and equipment to a space environment.

— Studies of Future Space Systems.

Future potential space systems being studied by MSFC include: a permanent Space Station which will provide a manned presence in space; unmanned Space Platforms for the conduct of space science experiments and application projects; a Tethered Satellite System by which experiments can be suspended from the Shuttle into the upper reaches of the atmosphere; a Teleoperator Maneuvering System which will add satellite placement and retrieval ca-

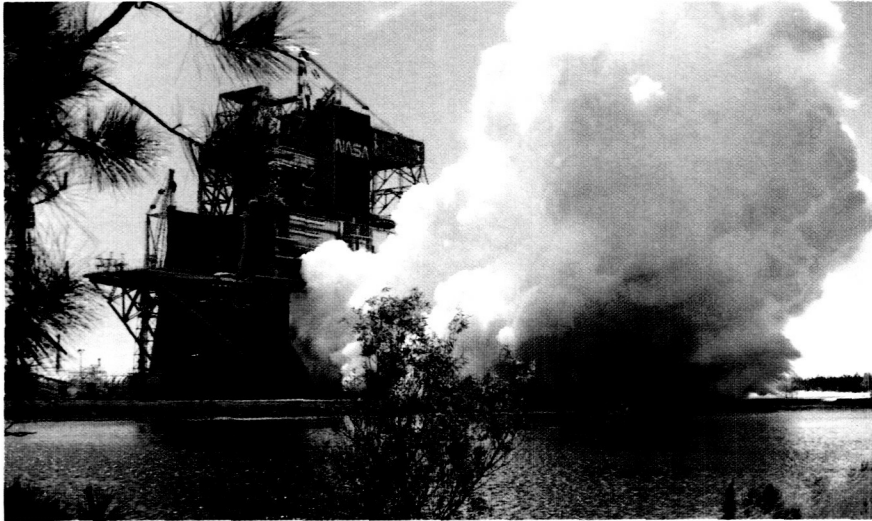
pability to the STS system; an Advanced X-Ray Astrophysics Facility which would be a national facility for the study of X-Ray sources; a Gravity Probe-B satellite which will test Einstein's theory of relativity; various Shuttle-derived launch vehicles which would eventually replace or augment the current Shuttle; large space structures and antennas for NASA and commercial applications; and various payloads for Spacelab missions.

In addition to onsite activities at Huntsville, Alabama, MSFC manages the Michoud Assembly Facility at New Orleans and the Computer Complex at Slidell, Louisiana. Resident offices are maintained at other NASA Centers, in conjunction with major industrial sites in various locations throughout the nation, and in Europe for the Spacelab program. As one of the largest NASA centers, many contracting and subcontracting opportunities are available from Marshall Space Flight Center. Companies which are interested in MSFC procurement programs should contact the MFSC Small Business Specialist for Assistance.

National Space Technology Laboratories

NSTL Station, Mississippi

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Static test firing of the Space Shuttle main engine at the National Space Technology Laboratories.

The National Space Technology Laboratories (NSTL) is the prime NASA installation for static test firing of large rocket engines and propulsion systems. NSTL, NASA's newest field installation, evolved from the former Mississippi Test Facility (MTF) which had been constructed, activated, and operated during the sixties for acceptance testing of the booster stages of the Saturn V rocket system. The redesignation by NASA of MTF as the new National Space Technology Laboratories in June 1974, recognized the expanded role the installation was playing in the nation's space and environmental technology efforts, in addition to remaining the prime static test facility for large liquid propellant rocket engine systems. The redesignation further recognized the increasing numbers of NASA and non-NASA programs being accomplished by resident elements at the facility.

At present, NSTL is heavily involved in support of the Shuttle Test Program, is conducting research in terrestrial applications, and is in charge of managing the base and providing technical and institutional support to federal and state resident agencies on a reimbursable basis.

For Shuttle, NSTL operates and maintains dedicated Shuttle facilities used for developmental testing of Space Shuttle Main Engine and the Orbiter Main Propulsion Test Program. These facilities include a high pressure industrial water facility, emergency power capabili-

ties, high pressure gas facilities (up to 6000 psi), propellant and cryogenic facilities, meteorological and acoustic facilities, and support laboratories and shops. In addition, NSTL provides laboratory, shop and technical services essential for conducting the test program. These include standard laboratory services, instrument calibration and repair, gas and chemical analysis services, material analysis, x-ray, and photographic reproduction services, electronic equipment repair, component cleaning services and shop services for modification of facility, equipment and test hardware.

In terrestrial applications programs, the focus of the installation's capability is in its Earth Resources Laboratory (ERL), which is currently engaged in remote sensing technology research and development in three interrelated areas:

- a) Research investigations for improved knowledge and information extraction techniques;
- b) Research and development of low-cost and efficient data processing systems;
- c) Specially designed test and evaluation projects for the application of remote sensing to current resources management requirements.

New technology dissemination is through technical reporting and interactive associations with potential

users at various levels of government and private industry.

NSTL also conducts a modest program in environmental systems development with a focus on innovative approaches to waste water treatment, food and energy production, and air purification. Application could be in a closed life support system in a space environment.

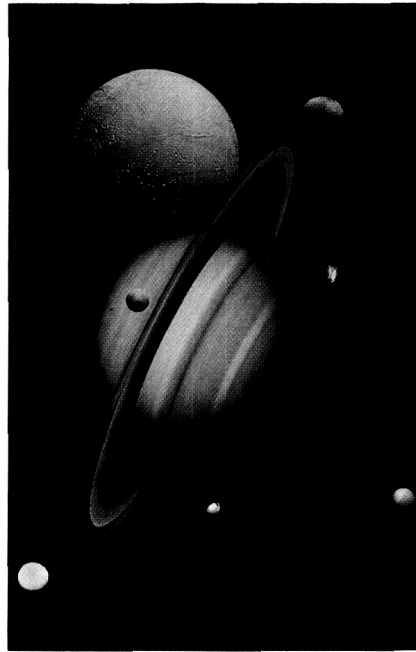
In its third role, NSTL provides and manages an institutional base for support of NASA and other federal and state agencies resident on site. The base encompasses 140,000 acres of fee-owned or leased land, more than 70 permanent buildings and structures, 35 miles of roads, 7½ miles of canals, and state-of-the-art laboratories, shops, technical systems, facilities, and equipment. The resident agencies include elements of the Department of Defense (U.S. Navy and U.S. Army), National Oceanic and Atmospheric Administration, Department of Interior, Environmental Protection Agency, U.S. Coast Guard, Mississippi State University, State of Louisiana and Louisiana State University. These agencies are involved in oceanographic, meteorological, and environmental research, as well as other activities. Together with NASA, the combined agencies form a scientific and technical community, each pursuing its own programmatic objectives, but collectively producing a scientific base for technology interchange. NSTL provides institutional and technical services to all agencies on a reimbursable basis and in accordance with approved agreements.

Although the value of NASA procurement at NSTL is smaller than many of the other centers, unique opportunities may exist for firms with specialized technical expertise, as well for companies with facilities management and support capabilities. The Small Business Specialist at NSTL may be contacted for additional guidance.

Jet Propulsion Laboratory

Pasadena, California

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Montage of actual photos of Saturn and seven of its major satellites, taken by Voyagers I and II (the Voyager program is managed by JPL).

The Jet Propulsion Laboratory (JPL) of the California Institute of Technology is a Government-owned research, development and flight center, that performs a variety of tasks for NASA. JPL works under close direction of NASA Headquarters, with day-to-day administration and coordination being provided by the NASA Resident Office.

JPL's primary role is the scientific investigation of the planets and deep space, using automated spacecraft. The Laboratory is also responsible to NASA for supporting research and advanced development related to flight projects, as well as management and operation of the Deep Space Network in support of those projects. In addition, JPL conducts selected projects to develop and apply new technologies to the solution of problems on earth, with emphasis on solar energy and conservation studies. These projects are sponsored by other Government departments and agencies with the concurrence of NASA.

JPL's current tasks include the Voyager mission to the outer solar system and the planets Uranus and Neptune, the continued exploration of Jupiter with the Galileo orbiter and probe, U.S. management of the Infrared Astronomical Satellite and the International Solar Polar Mission, development of the Venus Radar Mapper and Extreme Ultraviolet Explorer spacecraft, and planning

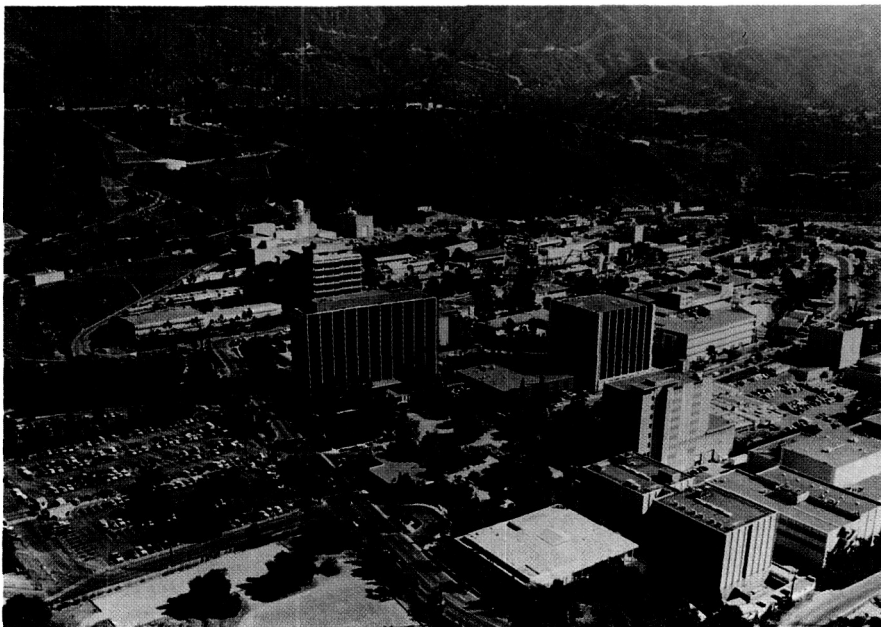
for a proposed Mariner Mark II series of low-cost space missions.

Supporting research and advanced development are conducted in electric propulsion, nuclear power, chemical propulsion, aerothermodynamics, fluid physics and electrophysics, applied mathematics, space power generation, optical and radio astronomy, planetary atmospheres, fields and particles, long-range communications, guidance and control, and systems simulation and analysis techniques. These programs make substantial contributions to NASA programs in propulsion, tracking and data acquisition, and lunar and planetary exploration.

Many of the technical advancements required for the success of lunar, planetary, and space exploration are also applicable to problems of critical national interest. Under the direction of NASA, JPL is expending considerable effort in the application of space-derived skills and capabilities to needs of the civil sector.

Because of the heavy emphasis on research and development, JPL seldom buys in large quantities, with the exception of some electronic components. A significant portion of the total JPL procurement budget is spent on the following products and services: fabrication, electronic components, electronic instrumentation and test equipment, miscellaneous facility supplies and services, automatic data processing equipment, and construction. Either the JPL Small Business Specialist or Minority Business Specialist, or the Small Business Specialist at the NASA Resident Office will assist companies in identifying procurement opportunities at JPL.

The Jet Propulsion Laboratory, occupying 177 acres in Pasadena, California, is a Government-owned facility that is staffed and managed by the California Institute of Technology, under contract to NASA.





Several key Government agencies offer major assistance programs and other services to small businesses.



Although the Federal Government is extremely complex, there are several excellent sources of information and guidance which can be very useful to small and disadvantaged businesses. Some of the key government agencies and their services or publications are briefly described in this chapter.

Sources of Additional Help

All Government Agencies

Public Law 95-507 requires each Federal agency having procurement powers to establish an Office of Small and Disadvantaged Business Utilization to assist small and minority businesses. These offices are staffed with individuals dedicated to helping small companies do business with their agency, and are an excellent source of information and assistance. The name, address and phone number of the Small and Minority Business Specialist at each NASA Installation are listed at the end of this chapter.

Small Business Administration

The Small Business Administration (SBA) has numerous programs to help small businesses, ranging from free publications to technical assistance. SBA services are provided through local field offices at major cities throughout the country. These offices are listed under "U.S. Government" in the appropriate telephone directory, and the NASA Small Business Specialist at any installation can direct companies to the nearest SBA office as well. All small businesses are encouraged to avail themselves of the many publications, services and programs provided by the SBA. Two particularly useful publications produced by SBA are the "Small Business Subcontracting Directory," which lists major prime contractors with high potential for subcontracting, and the "U.S. Government Purchasing and Sales Directory," which is a guideline to which government agencies buy particular goods and services. For more information on these publications, and other SBA services, contact the nearest SBA office.

Department of Commerce

As the main business agency of the government, the Department of Commerce offers various types of assistance and guidance to small businesses. A special program called ROADMAP, under cognizance of the Commerce Department's Office of Business Liaison, has been created to help companies find their way through the myriad of federal agencies to find answers to business related questions in areas such as international trade, taxes, business licenses, franchising and others. More information may be obtained by writing to ROADMAP, Office of Business Liaison, U.S. Department of Commerce, Washington, D.C. 20230.

The Minority Business Development Agency (MBDA) is an agency of the Department of Commerce specifically established to provide comprehensive assistance services to minority businesses. MBDA services are provided primarily through a nation-wide network of Minority Business Development Centers. MBDA regional offices in Atlanta, Chicago, Dallas, New York, San Francisco and Washington, D.C. will provide the name and telephone number of the nearest Minority Business Development Center upon request. This information is also available from an extremely useful publication prepared by MBDA and entitled, "Guide to Federal Minority Enterprise and Related Assistance Programs." This document contains a comprehensive summary of all federal programs designed to assist minority-owned businesses, and is available through MBDA regional offices. It is likely to be very useful to non-minority small businesses as well.

The National Technical Informa-

tion Service (NTIS) is sponsored by the Department of Commerce to provide access to millions of technical documents and reports resulting from federal programs. The publications and services of NTIS are made available for a reasonable price which reflects the cost of providing them. More information may be obtained by writing to NTIS, Springfield, VA 22151.

General Services Administration

The General Services Administration (GSA) acts as the purchasing agency for numerous items of equipment and supplies, as well as services used by federal agencies. A small business can learn of items bought by GSA by writing to or visiting the nearest GSA Business Service Center. These offices are located in Atlanta, Boston, Chicago, Denver, Fort Worth, Kansas City, Los Angeles, New York, Philadelphia, San Francisco, Seattle, and Washington, DC.

The General Services Administration also supports a network of Federal Information Centers, which are staffed to provide or locate sources of information on all federal programs and services, and help to find answers to both business and consumer-related questions. The centers are listed as "Federal Information Centers" under U.S. Government in the telephone directories of approximately seventy major cities, and a list of all the centers is available by writing to the Consumer Information Center, Pueblo, Colorado 81009.

Additional Publications

There is a wealth of material available to provide information to small and minority entrepreneurs, much of

it available through agency Offices of Small and Disadvantaged Business Utilization.

The Department of Defense produces numerous valuable documents, including a directory of major prime contractors offering subcontracting opportunities. An extremely useful publication for small R&D companies, entitled "Small Business Guide to Federal R&D Funding Opportunities," is published by the National Science Foundation and is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The "Handbook for Small Business," compiled by the Select Committee on Small Business of the U.S. Senate, is another very useful guide to Federal small business programs and is also available from the Government Printing Office.

All small and disadvantaged business owners are encouraged to visit the small business offices of agencies with interest in their products and services, to both seek assistance and review the large amount of written material which is available.



There are many useful publications which are available to assist small firms in their efforts to do business with the Government.

National Aeronautics and Space Administration

Small/Minority Business Personnel

NASA Headquarters

Washington, D.C. 20546

Office of Small and Disadvantaged Business Utilization

Director	Eugene D. Rosen	(202) 453-2088
Small Business Advisor	Judson O. Harrison	(202) 453-2088
Minority Business Advisor	Eugene D. Rosen	(202) 453-2088

Contracts and Grants Division

Small Business Specialist	Mark E. Kilkenny	(202) 453-1840
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Field Installation Small/Minority Business Specialists

<i>Ames Research Center</i> Mail Stop 241-1 Moffet Field, CA 94035	Sharon Piper	(415) 694-5800
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<i>Goddard Space Flight Center</i> Code 263 Greenbelt, MD 20771	Franz Hoffmann	(301) 286-6574
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<i>Johnson Space Center</i> Mail Code BD35 Houston, TX 77058	Robert L. Dupstadt	(713) 483-4134
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<i>Kennedy Space Center</i> SI-PRO-A Kennedy Space Center, FL 32899	Norman Perry	(305) 867-7353
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<i>Langley Research Center</i> Mail Stop 144A Hampton, VA 23665	Vernon Vann	(804) 865-3438
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<i>Lewis Research Center</i> Mail Code 500-313 Cleveland, OH 44135	Steven L. Fedor	(216) 433-2144
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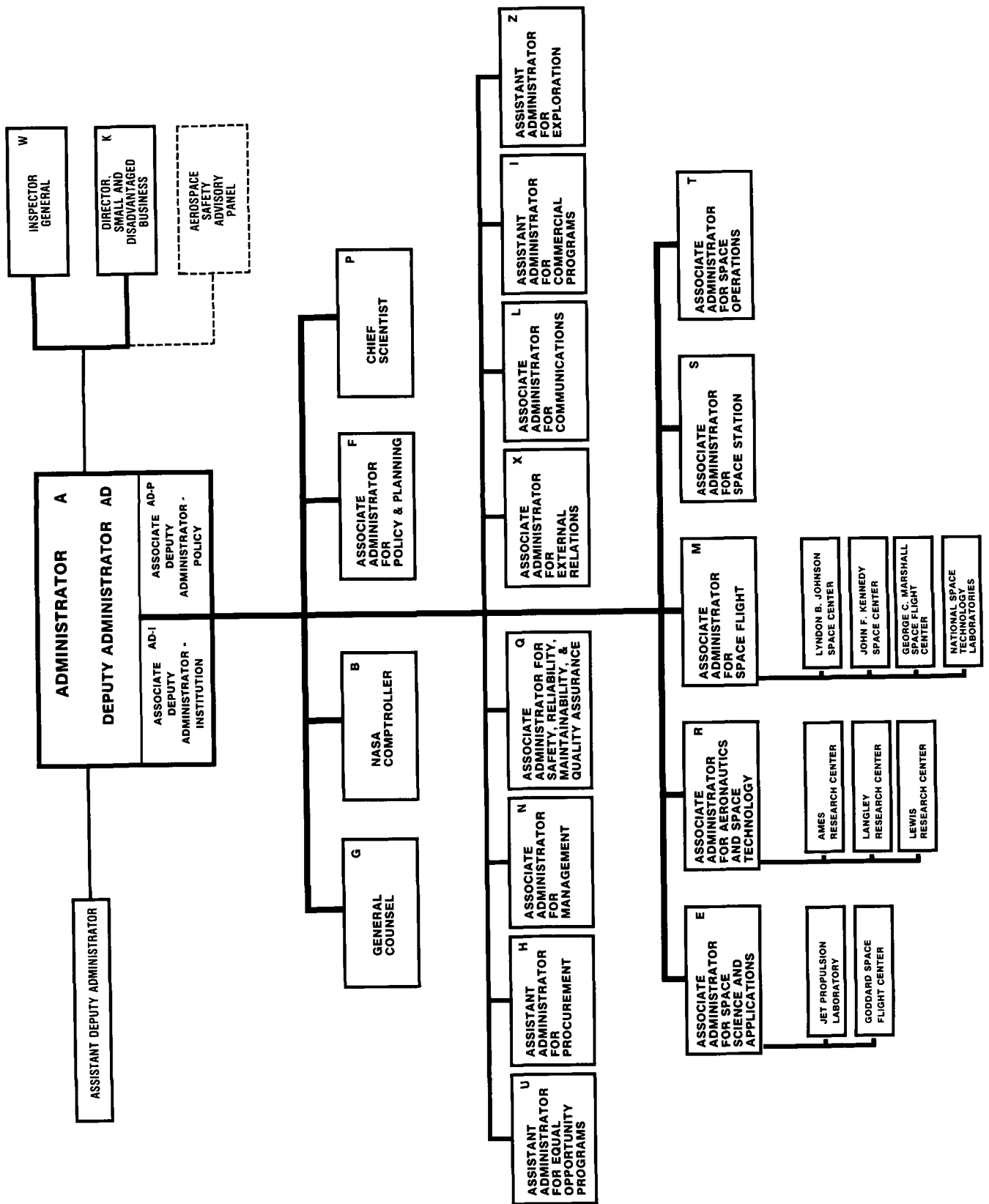
<i>Marshall Space Flight Center</i> Code AP01 Huntsville, AL 35812	Conrad Walker	(205) 544-0254
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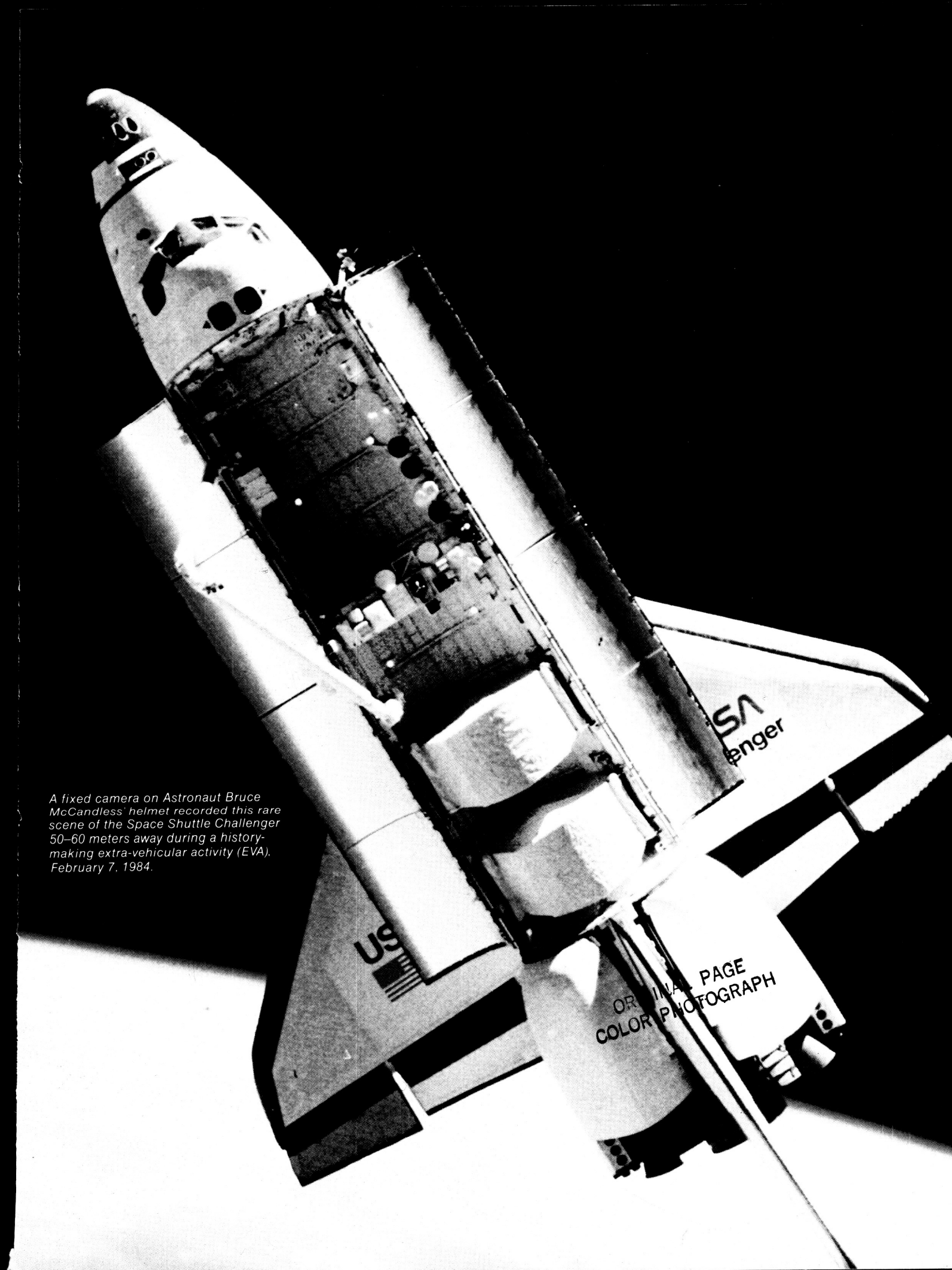
<i>National Space Technology Laboratories</i> Code DAOO NSTL, MS 39529	David M. Andersen	(601) 688-1636
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<i>NASA Resident Office-JPL</i> Pasadena, CA 91109	DeVon Biggs	(818) 354-6050
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<i>Jet Propulsion Laboratory</i> Pasadena, CA 91109	Margo Kuhn Tom May *	(818) 354-5722 (818) 354-2121
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*Minority Business Specialist





A fixed camera on Astronaut Bruce McCandless' helmet recorded this rare scene of the Space Shuttle Challenger 50-60 meters away during a history-making extra-vehicular activity (EVA), February 7, 1984.

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